University of California Bancroft Library/Berkeley
Regional Oral History Office

Maynard A. Amerine

THE UNIVERSITY OF CALIFORNIA AND THE STATE'S WINE INDUSTRY

With an Introduction by

Emil M. Mrak

An Interview Conducted by
Ruth Teiser

Copy Number ____

San Francisco Chronicle

March 13, 1998

Maynard Amerine

Maynard Amerine, a retired University of California enologist who was one of the pioneers of California's wine industry, died Wednesday at his home in St. Helena.

Mr. Amerine, who had been in failing health because of Alzheimer's disease, was 86. He was the second major figure in the wine industry to die this week. On Tuesday, Jack Davies, the owner of Schramsberg Vineyards, died in Calistoga at the age of 74.

"I'd feel a lot better if some of our industry would just keep on living," Robert Mondavi, the chairman of Robert Mondavi Winery, said yesterday, saddened by the deaths of two men he had known a long time. "I knew Maynard from the beginning, and he was an inspiration to all of us. He stimulated all of us."

Where Mr. Davies was known as an innovator in the nascent world of California champagne, Mr. Amerine's fame stemmed from his work over nearly 40 years in the scientific world of winemaking.

In 1936, Mr. Amerine joined the faculty at the Department of Viticulture (now the department of Viticulture and Enology) at UC Davis, at a time when the nation was trying to recover from the austere effects of Prohibition.

The wine industry was practically moribund, equipment was sparsely available and there was only a handful of good grapes in California.

"People had forgotten all they knew before about California wine," Mr. Amerine said years later. But the blank slate inspired Mr. Amerine to experiment and seek new ways to breathe life back into the industry.

What made Mr. Amerine stand out in the field of wine men, as they were called 60 years ago, was his ability to see California and its regional climates and micro-climates as ideal for growing wine grapes.

In 1938, Mr. Amerine and another UC Davis professor, Albert Winkler, used climate conditions to classify California's wine-growing regions into five districts, from Region I, the coolest districts, which are near the coast, to Region V, in the San Joaquin Valley, with its intense heat.

"Those five growing regions are still used (as benchmarks) in the industry," Ted Edwards, the winemaker at Freemark Abbey Winery, in St. Helena, said yesterday. "It's still a tool. He was a pioneer, a true patriarch of the modern-day industry, in terms of giving us tools from an academic point of view on how to go about making wine."

Mondavi said "I built my whole business" on Mr. Amerine's books on wine-making. "If you followed that, you could not help but do an outstanding job. I used (them) as my Bible."

Mr. Amerine wrote "Table Wines: The Technology of their Production," (with M.A. Joslyn), and several books on sensory evaluation of wine. Perhaps his best known book is the "University of California/Sotheby Book of California Wine," co-edited with Bob Thompson and Doris Muscatine and published in 1984.

During World War II, Mr. Amerine served in the Army, where he was a major in the Chemical Warfare Service, stationed in Algeria and India.

Mr. Amerine was a member of numerous wine and food organizations and frequently traveled to Europe and South America to consult for wineries, judge international wine contests and give speeches on wine history. Like Mr. Davies, he was also a member of the Bohemian Club.

Services for Mr. Amerine will be at 11 a.m., Wednesday, at Grace Episcopal Church, 1314 Spring Street, St. Helena.

Mr. Amerine, who was not married, is survived by three cousins — Richard Amerine, Mervyn Amerine and Bill Amerine, all of the Modesto area.

— Michael Taylor

San Francisco Chronicle, June 4, 1974

Heady Tribute to A Wine Expert

By Keith Power

California's proud and prosperous wine industry paid an affectionate tribute yesterday to the professor who helped guide its first steps following the terrible blow of Prohibition.

The occasion was the impending retirement of Maynard A. Amerine, professor of enology and former chairman of the Department of Viticulture and Enology at the University of California at Davis.

Because the luncheon was sponsored by the industry's Wine Institute, the tables at the Sheraton-Palace were laden with wines bearing a representative sweep of California labels. The head table was so authoritative, that members unabashedly mixed reds and whites for experimental rose.

From these gentlemen came high praise of the tanned and vigorous guest of honor; the most effective perhaps, being: "Everyone who has ever raised a wine glass is, in some way, in debt to Maynard."

Ernest Gallo, wryly acknowledging Amerine's international reputation, described travels with the professor in which the giant of the California wine industry found himself trailing admiring dignitaries around the academician.

"I was left to follow," he complained mockingly. "None of them kissed me."

Amerine, a native of San Jose, joined the university faculty as a junior enologist — or expert on wine-making — in 1935. as the industry tried to recover from the 13 years of drought known as prohibition. Commercial wine-making was outlawed during those years.

The professor recalled the sorry state of the industry in those Depression years: there was no equipment, no distribution system, only small amounts of good grapes . . . "people had forgotten all they knew before about California wine."

Today the industry is looking forward to another bumper crop after last year's largest grape crush of 365 million gallons.

Other wine-growing states like New York and Ohio never caught up with a 1930s decision by the state of California to invest in basic research in grape-growing and wine-making to help its struggling industry, Amerine said.

MAYNARD AMERINE
'People had forgotten'

He said the industry had the advantage of a heavy flow of literature and advice from university researchers at Davis, and later, Fresno. No other state — or country — could match this basic source material, he said.

The Wine Institute, among other gifts, presented the professor with a leather-bound volume of grateful messages from his friends in the industry. A quote by Benjamin Franklin was engraved on the cover:

"Wine is a constant proof that God loves us and loves to see us happy."

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PREFACE

The California Wine Industry Oral History Series, a project of the Regional Oral History Office, was initiated in 1969, the year noted as the bicentenary of continuous wine making in this state. It was undertaken through the action and with the financing of the Wine Advisory Board, and under the direction of University of California faculty and staff advisors at Berkeley and Davis.

The purpose of the series is to record and preserve information on California grape growing and wine making that has existed only in the memories of wine men. In some cases their recollections go back to the early years of this century, before Prohibition. These recollections are of particular value because the Prohibition period saw the disruption of not only the industry itself but also the orderly recording and preservation of records of its activities. Little has been written about the industry from late in the last century until Repeal. There is a real paucity of information on the Prohibition years (1920-1933), although some wine making did continue under supervision of the Prohibition Department. The material in this series on that period, as well as the discussion of the remarkable development of the wine industry in subsequent years (as yet treated analytically in few writings) will be of aid to historians. Of particular value is the fact that frequently several individuals have discussed the same subjects and events or expressed opinions on the same ideas, each from his own point of view.

Research underlying the interviews has been conducted principally in the University libraries at Berkeley and Davis, the California State Library, and in the library of the Wine Institute, which has made its collection of in many cases unique materials readily available for the purpose.

Three master indices for the entire series are being prepared, one of general subjects, one of wines, one of grapes by variety. These will be available to researchers at the conclusion of the series in the Regional Oral History Office and at the library of the Wine Institute.

The Regional Oral History Office was established to tape record autobiographical interviews with persons who have contributed significantly to recent California history. The office is headed by Willa K. Baum and is under the administrative supervision of James D. Hart, the Director of The Bancroft Library.

Ruth Teiser
Project Director
California Wine Industry
Oral History Series

1 March 1971
Regional Oral History Office
486 The Bancroft Library
University of California, Berkeley

INTRODUCTION

Dr. Amerine is a Californian through and through. He was raised in Modesto where he attended grammar and high schools. He received his college education at U.C., Berkeley. The latter included the Ph.D. which he obtained under the guidance of the very renowned scientists Hoagland and Davis.

After completing his Ph.D. and upon the repeal of Prohibition, Dr. Amerine was employed by Professor A.J. Winkler to undertake and lead the way in the development of an enology program at Davis. His first work involved the relation of varieties, locations, climate to the quality of wine. Out of the many years of such work evolved the very fine wine industry that California has today. Out of this, too, came the development of an enological research center that leads the world and even attracts people to study from some of the greatest wine producing areas of the world including France.

As years went by, Professor Amerine displayed his qualities not only as a scientist of great merit and distinction, but also as a person with a variety of talents and interests.

Professor Amerine has been responsible for many publications including books, pamphlets, and popular and scientific articles, and is among the leaders of those at Davis publishing scientific articles. In order to do this and keep up to date in his field, he has resorted to literature in a number of languages, including French, German, Spanish, Portuguese, Italian, Russian and even a few others. This in itself displays his unusual talent and intellectual qualities.

But Professor Amerine has been and is interested in many things other than research and science. His interests are indeed broad. He is concerned with and enjoys the so-called finer things of life, including art, drama, music, good food and, of course, fine wines. Because of these interests, his scientific background and his ability to express and explain, he is an excellent and stimulating teacher, greatly appreciated by students at both the undergraduate and graduate levels. He is also an interesting conversationalist and because of this is a popular dinner guest.

Furthermore, Professor Amerine is unusually curious about various cultures in the world. In line with this he is a much travelled man and there are no people at Davis who have seen more of the world than has Amerine and, in fact, there are few people any place who have travelled as extensively as he has. This has enabled him to make enriching observations and to obtain experience in a large number of countries and some of the most remote places in the world. For example, he has been in Mongolia on the one hand and through a number of African nations on the other. It was said by Chancellor Freeborn that no matter where he might travel, he always found that Amerine had preceded him there and is the member of the Davis staff who was most universally known.

Dr. Amerine is interested in cooking and has been a key person in organizing and maintaining the Wine and Food Society of Davis.

As a result of his scientific background, his intellectual exposure and experiences, his broad interests, and understanding of people, he has become one of the faculty leaders on the Davis campus. This in spite of the fact that he has not expressed a desire to be other than a good professor and research worker. Nevertheless, he was Chairman of the Academic Senate and his leadership was indeed one of the best--his understanding, his motivation and his wisdom were unequalled.

As Chancellor I called on him frequently because of his depth of knowledge, understanding, experience and wisdom. He was a tower of strength to me when as Chancellor I needed faculty advice and input.

There are few people, if any, on the Davis campus who have as many acquaintances and friendships among our leaders in industry, government and the arts.

Because of all these things and because of his modesty, his depth of understanding and wisdom, he has had a profound influence on the Davis campus. Serving on the Chancellor's Committee on Buildings and Grounds, he has been a strong influence on the physical development of the campus. Likewise, as Chairman of the Academic Senate he has been a constructive influence in the area of educational policy and other matters relating to the educational program at Davis. The faculty has recognized these unusual talents and accomplishments by naming him one of its faculty lecturers.

The Davis campus is fortunate to have a man with such a wealth and breadth of talents and the willingness to use them for the benefit of the campus, the people of the State, and, in fact, the country and the world.

Emil M. Mrak
Chancellor Emeritus
University of California at Davis

13 January 1972
University House
University of California at Davis

INTERVIEW HISTORY

Professor Amerine's interview was given in two sessions, the first on July 15, 1969, shortly before he left on a trip around the world, the second on January 30, 1971. In each case a list of suggested subjects was sent to him in advance; he incorporated them into his interview, which he organized in his mind before relating his recollections. Consequently, the transcripts required little editing.

The first interview was held at the University of California, Davis, in a teaching room in Wickson Hall. Professor Amerine was under pressure of time, finishing reading page proofs of a book before leaving the campus. He spoke hard and fast for three hours without interruption. The initial transcript was sent to him in December, 1970. He made a few minor corrections in wording and added some pertinent material prior to the second interview session. That was held in San Francisco on a Saturday morning. In an hour and a half of again concentrated speaking, he completed his reminiscences and discussion of various aspects of the wine industry. The transcript of that went to him in November, 1971, and he again made few changes but a number of additions.

The principal aim of the Regional Oral History Office was to secure from Professor Amerine a long-range view of the progress of the California wine industry as he has seen and participated in that progress, and discussion of the factors that underlay the work resulting in his many publications. That aim has been achieved in this well organized, coherent account.

Acknowledgement should be made of Professor Amerine's generous assistance to the California wine industry oral history project. His broad knowledge of all aspects of the industry, from sensory evaluation to trade barriers, and his acquaintance with almost all California wineries, have been of assistance in the planning and execution of the project. His introductions to all of the interviews but his own have given them a valuable added dimension.

Ruth Teiser
Interviewer

10 April 1972
486 The Bancroft Library
University of California at Berkeley

(Interview #1 - University of California, Davis, July 15, 1969)

EARLY YEARS

Amerine: To start with why I actually got into viticulture and enology. I was a plant science major here at the Davis campus in 1930...

Teiser: Could I ask you, perhaps, before you start this to give a little of your personal background, your family, your early education? I gather from your name that you have a French heritage, do you not?

Amerine: No.

Teiser: Is there anything in your heritage that connects with your career?

Amerine: No, nothing at all. My family were all born and raised in East Tennessee near Marysville and came to California between 1904 and 1908. I was born in San Jose in 1911. They were prune growers in the Santa Clara Valley. They were grape and apricot growers at Madera, and they were primarily peach growers in Modesto starting about 1921. I went to country school and later to city schools and Modesto high school, and then went to Modesto Junior College, as a pre-university major. And that brought me to the University then as a plant science major here at Davis in 1930.

Teiser: And you'd always known, as a young man, that you were going to be interested in science?

Amerine: Well, I had taken high school agriculture and had been quite active in projects in high school agriculture. I had known that I was going to go in

Amerine: for some form of university teaching or research even in high school. It wasn't quite clear to me exactly what research at the University was at that age--a farm boy going from a country school, and so forth. But as soon as I got to Davis, where I did fairly well, then it was quite clear that I did want to go into research.

I completed the B.S. degree in plant science at the end of 1931. I took the last semester in Berkeley in order to get some pre-research courses at Berkeley that could prepare me for graduate research. I had a scholarship--I guess they call it the Hamilton Fellowship--that year and the next year. I became a candidate for the Ph.D. in Plant Physiology in the Department of Plant Nutrition. There I became a good friend of Charles B. Lipman, who at that time was Dean of the Graduate Division. For two years I was his teaching assistant--teaching Plant Nutrition Ten, I believe they called it at that time, which was a general course for football players and sorority girls who thought they were going to get a good grade. They didn't always get as good a grade as they thought they were going to get!

Now, my actual major was in plant physiology and I did my work with A. [Alva] R. Davis who was at that time in Plant Nutrition and later became chairman of Botany and finally was one of the chancellors on the Berkeley campus--the first chancellor on the Berkeley campus who was what we called a "budget chancellor." He had his own budget separate from the President's office.

Anyway, I don't think I had a very brilliant thesis: it was on photosynthesis and how plants of different colors responded to light and temperature conditions, and I did a lot of analyses of sugar content and so forth. I suppose I made a thesis out of it all right.

EMPLOYMENT BY UNIVERSITY

Amerine: As I was finishing this thesis--I shouldn't say finishing--getting into where I knew I had a thesis, in the sping of 1935, Professor [Albert J.] Winkler, looking forward to the separation of the Division of Fruit Products and Viticulture into two divisions as of July first that year, had a vacant position at Davis. And I had already had Winkler's course in viticulture at Davis. Of course, Davis was a very small place then so people who went to Berkeley and got Ph.D.'s were pretty well known. I suppose I had a good recommendation from the Dean of the Graduate Division, who was a rather formidable character in his own right, and the fact that I had been his teaching assistant for two years probably didn't do me any harm. But anyway I came on the staff as a Research Associate on July the first of 1935. Actually. I didn't finish the thesis to turn it in until late that year or early in 1936. And the first ladder position that I had was July first, 1936, when I became Junior Enologist in the Agricultural Experiment Station.

Teiser: May I interrupt you for a minute and ask you a question?

Amerine: Sure.

Teiser: Dr. Maynard Joslyn said something to me that indicated that you were very much chosen for the position that you have actually taken. Was the choice made at that time? Were you conscious of being...

Amerine: No. I think that that's more flattery than truth, probably. Actually up until the war my position was rather a minor one here. In fact, there wasn't any great consciousness of the University of California's leadership in the field until after the war. It was not until after the war that the whole picture fell into focus and gradually the leadership and the direction of the program came to Davis. Perhaps not until 1950 would it be quite clear that that was the position, and I wasn't really conscious of it perhaps until as late as 1954. But by 1957 it was clear that the industry itself looked here for the kind of guidance that they needed.

Teiser: Another approach perhaps to the same point: someone else said, "How in the world did a bright young scientist happen to agree to go into this field at that time?"

Amerine: Well, that's a very easy question to answer because there weren't very many jobs open for Ph.D.'s at that time. My original intention was to go to Cornell where a man named Curtis was doing very good work in translocation, but there simply wasn't enough money. I had the scholarship here and I didn't have the scholarship there. When I actually got my Ph.D. in plant physiology, the only teaching opportunities were an occasional one in junior colleges. There were no new positions in the University. The University was in a period where no increase in staff was contemplated during the period of 1934, 1935 and 1936.

Teiser: The Depression.

Amerine: It was the Depression years, exactly. And of course I had a long background in agriculture. I was brought up on a farm and I was interested in agriculture, and I knew something about how grapes grow and so forth. It wasn't like taking a job teaching plant physiology at a junior college or something like that, where I had never taught before, although I had done some teaching at Berkeley as a teaching assistant. Here I knew the campus, one. Two, I knew the field that I was going into; and I knew a lot of people here, too.

Teiser: Did you know the wine field, as well as the...

Amerine: Well there wasn't much wine field in 1935. I thought we would come to that in just a moment. I think there might be one other aspect of why I came to Davis. I had worked the summers of '32, '33, and '34 with Professor L. D. Davis in Pomology and actually was helping him with research programs of his. So I had had three summers and two winter holidays working with somebody who was doing work in agricultural research work, and obviously I must have grown fond of the things I was doing, because when Winkler came in in '35 it was very obvious that this was a job that I could probably do. It didn't pay very much at that time. I was supposed to get two thousand dollars when I came to Davis, and the University reneged on that so I got eighteen hundred dollars the first year, which left a bad taste in my mouth for

Amerine: several years. Had I had a suitable opportunity I think I would have used that as an excuse for moving some place else later, because I don't think the University realized or cared that eighteen hundred dollars wasn't very much money in 1935.

Well, as of July the first, 1935, Professor [Frederic T.] Bioletti retired. In preparation for this, Professor Winkler had gone abroad in 1934 and Professor [William V.] Cruess had gone abroad in 1933--I am not sure of Cruess' trip, but I know that Winkler's trip was in '34. Now both of them had taken a look at research and teaching activities of universities and experiment stations in North Africa and most of the European countries, and they had both come back to the University with ideas as to how to carry on the research in viticulture and enology that the University Experiment Station would have to undertake.

And as it turned out the Dean listened to both of them and essentially gave both of them a free hand in what they were to do. Professor Cruess and his group very quickly got into the whole technology part, training people to actually operate wineries. And Winkler's idea for the Davis campus was, "You can't make a silk purse out of a sow's ear," and since Prohibition had left us with a lot of bad varieties--shipping grape varieties and things like that--what we needed to have was a major emphasis on which grape varieties should be planted and which parts of California they should be planted in.

EARLY RESEARCH AT DAVIS

Amerine: So, this was the project that I was brought to Davis to work on, and which I did work on very hard in 1935, '36, '37 and '38. And then in 1939 our research had begun to attract some attention in the industry. We had gone to some pains to tell the industry about the varieties that were good and the varieties that were bad. It was almost impossible to realize then what we know as common knowledge now--that people just didn't know anything about the grape varieties. When you talked to somebody about, "How many Cabernets have you got?" - "Oh, Cabernet; that's just another

Amerine: red wine grape." Or, "Have you got some Rieslings?" "No, we don't have any Rieslings, but it doesn't make any difference what variety of grape you have."

Now the industry has come a full 180 degrees away from that position. Everybody in the industry is very conscious of varieties, and nobody would even think of planting a vineyard any place in California without looking to the University for guidance and consultation. This is, of course, the huge change that has occurred in this comparatively short period of time.

We had made altogether some six thousand lots of wine--no it wasn't that many--about three thousand lots of wine by 1939, and Dean [Claude B.] Hutchison decided then that the research was at such a volume, that we were doing so much work, that we had to have some place to carry on the research that had better facilities. So the present enology building was built in 1939.

It was built in the far west and north of the campus so that if there were any smells developing in the building they would only blow over the agricultural fields from here towards the north part of town and they would be dissipated before they got to the residential part of town! Another reason for building it on that side of the campus was that it would cost too much money to put steam pipes out to where the vineyard area was, where at one time they had considered putting the winery.

The building, of course, now is in almost the geographical center of the campus, and no smells ever developed! And no great problems of security have ever developed in the building either. Even when the Signal Corps was using the campus as a training camp during the war we never had any problems with the building, probably because we changed the locks every once in a while and things like that--elementary security measures.

I might say that the direction of research at Davis had changed. Professor Bioletti had been interested in a winery before he retired. And his idea of how to build a winery was to build a high big winery, perhaps handling one hundred thousand gallons or more a year, in which commercial sized containers

Amerine: could be used, and the results could be applied directly to commercial practice.

The approach of Winkler and mine, which we arrived at almost immediately, was that with such a big winery we'd never get any place. We'd never get very many samples; we would be spending a lot of money on just pumping wines and so forth if we tried to operate on 50 or 200 gallon lots. So we immediately reduced the size of all of our lots to only five gallons and the new winery here was built with that in mind.*

After 30 years it is functioning essentially as planned. Of course, we've changed some of the emphasis and cooled some rooms and things like that. But the building today is functioning as we looked at it in the fall of 1938. I think they started construction some time in the winter, and it was completed in May of that year.

ENOLOGY BUILDING AND NEW STAFF

Amerine: As the building was under construction, the University administration, for reasons that I don't know and perhaps Professor Winkler might know, decided that there should be an expansion of the work here. Since I was the only one doing the work in enology and there were three people in viticulture, that alone, I suppose, represented something of an imbalance to them.

And it was true I was working night and day keeping ahead of all these lots of wines that we had, doing a great deal of physical work myself at that time. So the Dean came up with two new positions in the spring of '39 and Professor Winkler began to look for people. We brought here in August of '39 a chemical engineer, Professor James Guymon, to do work on brandy, since little or no work had been done on brandy in Berkeley, and also a microbiologist, the late Professor Castor. There had been quite a lot of good microbiological work done at Berkeley. Cruess himself was a microbiologist, and [Reese H.] Vaughn had come on the staff

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*See also p. 97.

Amerine: just at that time at Berkeley and he was a microbiologist. Emil Mrak was also a microbiologist. So there were really three microbiologists already interested in the problems of the wine industry. I suppose that the Chancellor and Dean felt that since we had such a large number of lots here that the relationship of microbiology to the varieties was of sufficient importance to bring another microbiologist on the staff.

We had at that time, 1936 or 1937, cooperated with Chancellor Mrak, then on the Berkeley staff, and provided him with samples of grapes to get some idea of the yeast flora of California grapes. That's a subject that Dr. Castor did not go into at all. In fact his own research...

Teiser: Castor? He was...?

Amerine: C-a-s-t-o-r. John G. B. Castor. He was the microbiologist that we brought here in 1939. He made his first work on the vitamin and amino acid requirements of yeast, and did quite good work in this field before he unfortunately passed away, in about 1954.

So there was really no conflict of interest between the two departments as far as research activities was concerned at any time, I would guess; certainly not at that time. However, it was obvious to anybody in the industry that the University had two voices with respect to the grape and wine industry--one in Berkeley and one at Davis. And a meeting was held some time in '38 or '39--I'm not sure just which year it was--in the director's office here, and Assistant Dean [Stanley B.] Freeborn came up from Berkeley and Professor Cruess and Professor [Gordon] McKinney and Professor [Maynard A.] Joslyn, and [Harold P.] Olmo, Winkler and I from here I guess. So there were eight of us present, and the law was laid down that the University ought to speak with a more united voice. I think this was said fairly nicely.

ORIGINS OF WINE BULLETINS

Amerine: The denouement of the story was, however, that Joslyn and I became the fall guys for bringing this about. And this was the beginning of a long publication program between Professor Joslyn and myself which started then and had continued up 'til now. It is still continuing this very minute.* We were charged with production of a bulletin which would present a unified view of grapes and wine making practices, and consider the points of view of both departments (actually divisions at that time).

Well, we set about this rather quickly and got along fairly rapidly. In the middle of doing the bulletin it was decided to split it so that the table wine pamphlet would be Amerine and Joslyn and the dessert wine pamphlet would be Joslyn and Amerine. We didn't get into the dessert wine one until around 1941 when Professor Guymon had already been on the staff as a chemical engineer for a year or two. In the midst of writing the dessert wine pamphlet we again split that pamphlet in half and made one other pamphlet: Bulletin 652 which became the brandy pamphlet,** and 651 became the dessert wine pamphlet.***

The one pamphlet on brandy was published in only a very limited edition, I think ten or fifteen hundred copies, with the thought that the war would soon be over and Guymon would be back from the war and he could write his own brandy bulletin! Well, it's only twenty five years from then and the bulletin is still not written, and the only publication the University has done on brandy is the little pamphlet that Joslyn and I wrote back before the war.

Teiser: Has it stood up?

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*At the time of the interview, Dr. Amerine was reading the proof sheets of the book Table Wines discussed on pp. 31-32.

**See Appendix I, "Published Writings of Maynard A. Amerine," #27.

***Appendix I, #26.

Amerine: Yes, that pamphlet would be the basis--if anybody tried to write a pamphlet on brandy production in California, they'd use that as a starting point. There have been some new techniques of controlling stills that came in after the war so that the stills now operate automatically instead of manually. New kinds of control devices have been developed. But generally speaking, yes, except for adding some analytical material and so forth, it's quite good. The theory of distillation is well done.

Anyway, the war, of course, put a considerable quietus on the wine research, both here and at Berkeley. We tried to get as many of the wines into glass as we could. Professor Winkler finished that up in 1942, and essentially there was no work in enology done at Davis from then until 1946.

Teiser: You were on duty...

Amerine: I was in the Army during that period of time. Guymon and Castor left even before I did.

There was a little work done by Cruess in Berkeley, but actually nobody got into the field very much during that period--lack of gasoline, and so forth. Only urgent programs could get sufficient gasoline.

THE HILGARDIA ON GRAPE VARIETIES

Amerine: Before I left--to bring the pre-war research into focus--it was decided to publish a Hilgardia in which we would summarize in considerable detail why we had done the research on grape varieties and what the results were. And this was the Amerine-Winkler publication which actually did not finally appear until 1944.* Some parts of the proof of that I read in the Army in Tennessee in 1943 before I went overseas.

That publication systematically went through the varieties that we tested--some 140 varieties--and gave the analytical results and some notes on the cultural handicaps of the different varieties (lack of production,

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*Appendix I, #40.

Amerine: disease susceptability and so forth). In general, it gave a pretty good guide for the industry. At the same time, Circular 356* was publsihed to summarize this in a handy form so the grower wouldn't have to go through tables and pages of small type. I think this did make a very good impression for the University. This plus the wine and brandy bulletin series focused attention on the University as the center of information on grapes and wine in California. There wasn't anybody else doing anything to start with, and it was becoming more and more obvious as the war came on and was completed that the future of the wine industry was going to be more and more technologically oriented. Since from the very start Joslyn and my approach had been technological, our bulletins represented the only kind of information that offered any hopes for them--or perhaps better, useful information for them.

Teiser: Were you getting any feed-back from the industry? Could you tell if people were reading them and paying attention?

Amerine: Yes, but we got the feed-back by actually going to the industry itself and holding meetings. For at least two and possibly three years before the war, Winkler and I started at Escondido in Southern California and spent three weeks in meetings once or twice a day. In these we showed our results on grapes we had collected in different regions, and what the analyses were and what our recommendations were. All the grower had to do, literally, was go to the nearest Farm Bureau meeting place and there we would be, either in the afternoon or in the early evening, and occasionally we would have a morning meeting.

We had made an attempt in this research to cover California as best we could from Escondido in the south to Ukiah in the north. In fact, one time Winkler and I made a trip up by Willow Creek. Coming into Eureka from the north there are some few grapes grown in some isolated little valleys there.

It was very obvious that the most important contribution we made at that time, as of 1944 when the Hilgardia was actually in print, was that we had clearly recognized that California had many climatic

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*Appendix, #37.

Amerine: zones for growing grapes. We had conceived the idea but we had proved it from temperature summation and from the analysis of the wines which we had made or of the grapes that we had collected. This was the reason why we had to cover the state during this period of time. Winkler and I harvested a great many of these grapes ourselves. We would go in the evening to San Jose, pick grapes at five o'clock in the morning and have them here at four in the afternoon, crush them, and take care of the other lots that were fermenting, and the next morning at five o'clock go to Napa and pick grapes. This went on for a period of six or eight weeks. Every fall, '35, '36, '37, '38, '39, '40, '41.

At any rate, the idea that California should not plant the same grapes in every region began to percolate. We didn't see many actual results because there weren't a great many grapes being planted at this time--the war for one thing--but we did see those results later in a very big way.

Teiser: Did people argue with you in the meetings--say they didn't believe you?

Amerine: No. Oh, we had some difficulties in the Napa Valley. They had planted some table grapes at the time of Prohibition, the purpose of the table grapes being that they could ship them East. People could make wine out of them. They didn't make very good wine. When Repeal came, of course, they were left with all of these bad table grapes, and they were also left with wine grapes which had thick skins. These were shipped to the Eastern market. In many cases they were very poor for wine but they had lots of color--the variety Alicante Bouschet, for example [spells it]. This makes terrible wine, and yet we had thousands of acres of it planted all over California during Prohibition.

They took Cabernets and Rieslings and grafted them over to Alicante in the '20's because it had very tough skin which could stand shipment to the East. It also had lots of color and they could add sugar to it and get five, six hundred gallons to the ton, of red wine. The demand was for red wine at that time.

Well, people who had these grapes obviously didn't want to give them up and they would put up

Amerine: mild protest, namely that these made good wines and how dare we tell them they didn't make good wines? But there were still enough old timers around (such as Carl Bundschu, for one, and Edmund Twight, for another) who would say, "Now, John, you know that your father, or your grandfather or uncle would never have had an Alicante in his vineyard, and just because you've got it doesn't mean that you've got to defend it."

I suppose the Palomino was the one that went out the hardest. It was called the Napa Golden Chasselas--sort of a euphemism. But it was really a table grape, a shipping grape, and made very poor quality table wine.

There's still some of them in the Napa Valley where it produces very well but the industry is abandoning it. It gets the lowest prices when using the sugar-acid ratio method of buying grapes. It just doesn't have enough acid to make it as grade one, two, three or four, and so it is usually sold as grade five (highest sugar-acid ratio). So it's been priced out of the market. It gets such low prices and makes such poor quality wine.

COLOR RESEARCH

Amerine: The other kind of research that Winkler and I, both of us, had been doing at the beginning of the war, we had tried to get some better measures of color in wine. And I suppose this was where I first went back to my plant physiology training. We tried to specify the color in more physical terms rather than using color standards and used a spectrophotometer for that purpose. And this was quite new at that time. There were very few people who were making color measurements in fruits using spectrophotometers, but wine lent itself very quickly to this because it's a uniform liquid and so you can measure it directly. If you try to measure the color of a tomato, which is not uniform and which is not a liquid, it becomes more difficult.

But for wines this is quite easy, and we also devised a method for extracting color from grapes. And this supplemented our work on the effect of

Amerine: regional conditions on color of grapes and wines in California. We could show that the same variety grown in a very warm region had very little color and grown in a moderately cool region had more color and grown in a cold region had even more color. It was very easy to show these results to the growers. They got the idea very quickly. "Well, it's true that the same variety doesn't come out the same."

There was quite a bit of a sort of horse-sense knowledge about this too. The famous Flame Tokay grape of Lodi grows in an area of not more than twelve square miles. If you grow it further south it doesn't have enough color, and if you grow it over in Napa or some place in the coastal valleys it has too much color. That was pretty well known; hundreds of people had tried to get in on the Tokay "boom" in the '20's by growing Tokays in other locations and had failed because it didn't develop the right tint of color. And this was due to temperature conditions primarily.

THE POST-REPEAL WINE INDUSTRY

Amerine: At any rate, let me say something about the industry during this period of time--1935 to 1941, up to the war. The industry itself was terribly undercapitalized at the time of Repeal. There were very few wineries in operation during Prohibition. There were only about six wineries that had sacramental wine permits. These wineries and perhaps others had gotten permission before Repeal to make wines under bond. With Repeal, several wineries did have a fair amount of stock of wine.

Others had to get new equipment. Most of their equipment had gotten to be pretty dilapidated, and in many cases cooperage was in very poor condition. And the most serious handicap, of course, was that there were no winemakers. There were old winemakers who were good, but they had gone into other industries and had made good there. They were not likely to come back to the wine industry. Without saying anything against some very nice people who had still retained an interest in the wine industry, we didn't really have, with maybe half a dozen exceptions, a highly

Amerine: trained corps of winemakers which we so sorely needed at that time.

There was Mr. E. M. Brown at Lodi who certainly was well trained.

Teiser: He was with Shewan-Jones?

Amerine: And he was with Shewan-Jones eventually, and he certainly had a concept of how to build a winery and so forth. There were a few others. [Enrico] Prati at Italian-Swiss at Asti knew his wine making. But by and large the industry had no laboratories, they had poor equipment, they had poor grapes, they were under capitalized and they didn't have enough wine-makers--certainly not enough trained winemakers. It was amazing that more of the wines didn't spoil during those years. In order to cut the spoilage down as quickly as possible, Mr. [Milton P.] Duffy of the State Department of Public Health set up some standards (maximum volatile acidity particularly).*

It was common knowledge to see wines that had been libeled (these were wines that could not be shipped because they had too much vinegar in them) from the wineries in 1935 and even in 1936. This was to protect the consumer and not let bad wine get out into the channels of trade and injure whatever reputation there was of California wines at that time.

Teiser: Some still got East and spoiled on the way, did they not?

Amerine: Well, that has been said. I have no personal knowledge of that, but obviously some rather poor wines did get into the eastern market. The conditions were almost unbelievable. It was very hard to get tank cars, for example, and when you got the tank car it might have had olive oil in it the day before, or it might have had petroleum in it the day before; and in many cases they were not really lined tanks, they were just metal tanks, so there was a huge pick-up of metal as they went East. Shipping in wood or in bottles was very expensive, so that getting wines to the eastern market was not easy.

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*See also pp. 83-84.

Amerine: There were a series of what we called Wine Technology Conferences in '35, '36, '37 which were really just short training classes. The various technical people at Berkeley, and sometimes later from here, gave little talks on simple things: how to determine sugar, how to determine alcohol content, how to determine sulfur dioxide, and things like that. A number of people came to Berkeley for night classes and short courses. Later many came to Davis for a week, and we put them in the laboratory and mechanically showed them: "Take pipette in right hand...add five drops."

That kind of instruction had to be done to salvage as much as we could of a difficult situation. Many of the pre-World War II wines were not very good. They were not, thankfully, advertised very extensively. Nobody had enough capital to advertise. At first there was no national distribution system. If you sent wines to New York, who would distribute them? Not all of the states got Repeal at the same time. Mississippi not until quite recently, in the last five or six years. And in many areas there were a lot of ex-bootleggers who were in the distribution business. Also wines were sold in bulk in many states, so they were spoiling right in the grocery stores, and in the liquor stores. They would buy a 50 gallon barrel and keep it for six months. Well at the end of that time they would still have a half full barrel, in Iowa or in Illinois. What they then had was vinegar, not wine, but it was being sold as California wine!

It's no wonder then that about 80 per cent of the immediate post-Repeal wine was dessert wine, because it wouldn't spoil in transit. This 80 per cent dessert wine had 20 per cent alcohol. And only 20 per cent was table wine. This has gradually changed until now it will soon reverse itself. It's about 60-40 in favor of table wine now, 1969, and each year it's getting to be more table wine and less dessert wine. One reason is that table wines stand up now; we don't have spoiled wine on the market. There were, of course, other reasons for the high percentage of dessert wines sold after Repeal.

At any rate, there wasn't as much sale as the industry had expected. Almost immediately they ran into all kinds of trade barriers. States wanted a $500 license for distributing, whether they distributed

Amerine: one case or five thousand cases. And some of those laws are still in existence. The one in Washington was only repealed this year, 1969, and there still are some very subtle trade barriers. Michigan, for example, allows no wine to be sold with over 16 per cent alcohol. So the Twenty-first Amendment was not all a blessing. It reserved to the states the control of alcohol beverages, and the states could if they wanted individually, be "dry" or impose such taxes as they wished.

Now, just as a sidelight, the industry has never challenged this interpretation of the law, but the interstate commerce provision of the Constitution would seem to take priority over the Twenty-first Amendment. If it did take priority, if the Supreme Court so ruled, then this restraint-of-trade thing of making exorbitantly high license fees for out-of-state wines and so forth would, of course, have to be repealed. But, to carry a case to the Supreme Court would cost a million or more dollars and then you might lose it, too. They might also rule that the Twenty-first Amendment took precedent as far as alcoholic beverages are concerned over the interstate commerce provision of the Constitution and then you'd lose everything.

Well, anyway, sales were at a low level and prices were very low, possibly partially justifiably and partially because there were a large number of bottlers in all parts of the country who were beating the price down, and every county and city practically had their own bottling. They would come to California and buy some wine and take it East and bottle it as their own wine or as "American wine" and so forth.

So, by 1938, which was only five years after Repeal, the industry was in the midst of a severe depression. The Wine Institute itself, a non-profit corporation, had done the best they could on interstate barriers. They were carrying on some public relations work. They had a Washington representative to persuade Congress and the legislatures not to go hog-wild on taxes and unnecessary operating restrictions. But, by and large, California wines were not very well known, as such, and their acceptance was minimal, and the prices they were getting for them were low. Even our best wines were selling for a dollar a bottle at that time. This was another reason why the industry wasn't very interested in planting high quality,

Amerine: low-producing varieties of grapes, because they said, justifiably, "Well, look, if we do plant these grapes that you recommend and we are only going to get a dollar a bottle from them--we can get sixty cents a bottle and get three times as much." It just wasn't in the cards. So there was not a great deal of planting of high quality varieties.

THE 1938 PRORATE

Amerine: In 1938 the Bank of America and the United States Department of Agriculture put together what was called the prorate program. This program was intended to take out new wine and distill it, either for brandy or for fortifying spirits to add to fermenting wines at some later date.

It wasn't very well thought out. There were several million dollars put into it. To show you that the industry was in a financially precarious state, I can tell you a little bit about how it actually operated. There was an office set up in San Francisco and samples of either their brandy or their high-proof spirits were sent to this office.

Teiser: Their what spirits?

Amerine: High-proof spirits: fortifying spirits. There was a manager there and these samples were set out on tables with numbers. All they had was numbers on them. We didn't know where they came from. And there was a committee set up of I think seven people from the industry and two from the University, and the Bank of America insisted that they would not loan money unless three of the people from the industry would sign the certificates and at least one of the people from the University--or maybe it was four from the industry and one from the University. And that meant that either George Marsh or I (the two University representatives) had to go to San Francisco several days a week to taste these new brandies and high-proofs. People would wait in the afternoon to get their certificates back so they could rush off to the bank to get enough money on the brandy that the prorate had accepted so they could pay their field men the next day.

Amerine: In essence the Bank of America, I would say, as of 1938, pretty well owned the California wine industry, as indicated by the fact that they were equal partners with the United States Department of Agriculture in setting up the prorate thing. It was a rather unpleasant experience for Professor Marsh and I, because the industry people would almost always accept all samples submitted, and so that meant that all the quality control had to be done by one or the other of us.

Many of the brandies were very high in iron or fusel oils (higher alcohols). People were distilling who had never distilled before. Old-fashioned inefficient stills were being operated that had not been operated for many years. The result was that pretty largely we (Marsh and I) did eliminate most of the bad ones. The prorate program, in the end, because of the war, turned out to be a great success. The Bank of America had got back everything on its money and maybe something over. The war created the demand for brandy, because of the limitation on distillation throughout the country, so that almost anything that had alcohol in it could be sold at a profit. These prorate brandies came out of storage four and five years later and became, of course, the stock in trade of the industry when they couldn't distill brandy during the war.

Teiser: Who told me that--I wonder if this is true--that a lot of that brandy went to the Christian Brothers....

Amerine: Well, I don't know who bought it. I was gone during the war. It could be bought by anybody. Anybody who had the money could go to the prorate office and buy it, as long as he had a permit to store brandy. That's the only thing the government required. You can't move brandy unless you move it from one bonded premise to another. So anybody who had had a bonded premise could buy that brandy and take it out of the prorate warehouses. I am sure other people got prorate brandy too. Schenley was on the market nation-wide at that time, and they took a great deal of interest in brandy.

WARTIME DEVELOPMENTS

Amerine: Anyway, the year after the prorate, I believe, there was not too big a crop and the prices, as the war approached, began to stabilize, and after the war started prices went up. Under the--what was the fair trade pricing thing during the war?

Teiser: O.P.A.?

Amerine: O.P.A., Office of Price Administration, or something like that. Mr. Johnson. At any rate, that agency fixed the prices of wine.

Teiser: Retail prices?

Amerine: Wholesale prices. At their 1939 to 1940 level. The industry, of course, could sell anything at almost any price. Demand for wines was great every place because they couldn't buy whiskies. Some whiskies came out as higher priced brands if they had been fair-traded before the O.P.A. They could use new labels on their whiskies and gins and sell at a new and higher price.

The wine industry was also in that position. Frequently they had no pre-O.P.A. higher priced brand. They had to buy wineries in order to get labels that had been fair-traded by the O.P.A. at higher prices. The most noticeable example was Schenley. Schenley, one of the great whiskey people, had moved into the California wine industry earlier than this, as a diversifying action. They saw that a huge amount of money could be made if they had a brand that could be sold at a higher price. Since Roma, their own brand was fair traded at a low price.

Teiser: Would you mind repeating the last sentence?

Amerine: Schenley had only Roma as a fair-traded label at only $6 a case or something like that. They were selling whiskey all over the country on allotment. They conceived the idea of the "tie-in" sales; namely, you get one bottle of Schenley whiskey if you buy three bottles of Roma wine. That was to the retail purchaser. But likewise they used the same thing at the retail store. The retail store had to buy 25 cases of Roma wine in order to get one case of whiskey. This

Amerine: was the infamous practice of the tie-in sale. And they worked it for all it was worth. Because they had an O.P.A. price that was low on Roma, they bought Cresta Blanca winery. Cresta Blanca had a fair trade price of let us say $12. They took what would have normally been $6 per case and sold it at twice the price. They are reputed to have made their purchase price back in the first year or two.

The tie-in sales gimmick left a bad taste in many retailers' minds. And still does leave a bad taste in many people's minds. In the first place, I believe the tie-in sale is, if not legally wrong, certainly morally wrong. To force a person to buy something he doesn't want in order to get something he does want is wrong. At any rate, National Distillers had also gone into the California wine industry and had bought the Italian Swiss complex. They also, of course, had whiskey brands and, although I don't know that they used the tie-in sale, it was common practice to use the tie-in sale. That was not a very good thing for the industry.

This, however, did raise the price of wine because instead of selling $6 a case wine, we were selling $12 a case wine. So the price of bulk wine went up from 50¢ a gallon to $1 a gallon and finally by the spring of 1947 had reached a price of $1.47 a gallon. This is the highest average price for raw wine that we had had in the history of the post-Repeal California wine industry. This was due to the fact that everything that was being made was being sold in 1945 and '46. Some people at that time had delusions that people would continue to drink wine even when whiskies became once more available. This turned out to be wrong. In the spring of 1947, whiskies that had been distilled toward the end of the war in 1946 began to come on the market without any tie-in sales. And the price of wine slipped from $1.47 a gallon to 70¢ a gallon inside of about three months, which is also probably the biggest single drop in prices that the California wine industry has ever had.

The war, however, did have some good things to it. It paid off a lot of mortgages. Wineries which were heavily mortgaged were no longer mortgaged. They also saw that they could sell wine at higher prices for the first time. They had just never thought that people would pay $2 a bottle or $2.50 a bottle for

Amerine: wine, and yet during the war they did. The better quality wines especially sold at good prices. The net result was that people by the end of the war had a little different approach to the wine industry. There was more optimism in the industry.

Furthermore, the Wine Advisory Board had come into existence, and this gave the backing of the State of California to the wine industry. This is a governmental agency set up under the Director of Agriculture in Sacramento. The W.A.B. can set an assessment on wines that are sold. This income is used for research and advertising purposes and for public relations. We also have in California a Peach Advisory Board, a Dairy Advisory Board, a Beef Advisory Board, et cetera. These are all administered by the Director of Agriculture. The advisory board is the people in the industry whom he appoints to advise him on policy. The board does the actual setting of fees but he has over-all control. The Wine Advisory Board had a million to a million and a half dollars a year. They also could use money for research. They set up a rather elaborate medical research program at this time. They also fed money back to the Wine Institute for public relations work, and I believe this is still the case, although they are completely separate organizations.

And so, even though the price fell in 1947, and we have had at least a couple of other crop control programs, there has never been the pessimism about the industry since World War II that there was before World War II.

THE POST-WAR UNIVERSITY

Amerine: The University enrollment went up very fast right after the war, and this gave the departments in the University more money than we'd ever had before. And so I think now I'll go back and talk about the University after the war, and the kind of problems we had.

In the first place, we had a lot of students who came from the Army who wanted to learn something about grapes and wines, and they wanted to learn it very

Amerine: fast. Some of them were prepared, some of them weren't. This was true both at Berkeley and Davis. We also had the idea that we ought to have a broader program of research for the grape and wine industry. I do not know the background of the decision to move what was then the Department of Food Technology to Davis from Berkeley. The move was actually made in 1950, but it was, of course, known that it was going to happen much earlier than that.

The only one who was doing full-time wine work on any scale at Berkeley who elected to come to Davis was Professor [George L.] Marsh. The other wine men at Berkeley remained there. Professor Cruess was getting ready to retire, and of course, stayed in Berkeley. Professor Joslyn also elected not to come. Professor Vaughn's interest at that time had turned more to olives than the microbiology of wine. And Professor [Herman J.] Pfaff, who had been interested in wine yeasts at Berkeley, turned more to the taxonomy and other aspects of yeast. Mrak, who had done work both on yeasts and on iron and other metals in wines before the war, was now the chairman of the department. He was busy building up the new department and spent all his time on that. So I suspect more by default than by design, the teaching and most of the research in wine gradually fell to the Department of Viticulture and Enology. Marsh carried on some projects on which he published several papers, until his retirement. Joslyn has published a lot and still carries at least two wine projects that I know of, perhaps more. But teaching in this area has gradually devolved over into Viticulture and Enology.

We brought about 1950, I guess, Professor Harold Berg to the University from the wine industry. He had a master's degree from Oregon in chemical engineering and had had 18 years of experience in the industry. We were quite interested at this time....

Teiser: Had he been at Cresta Blanca?

Amerine: He had been at Cresta Blanca before that, yes. We felt that we needed someone to take the research of the University, both from Berkeley and Davis, to the industry as quickly as possible. And he was first hired to work as a liaison man between the industry and the University. We were particularly interested in showing the industry better methods of making wine and in continuing our campaign for planting better new

Amerine: varieties of grapes. And he did that work, although he gradually got into research. He does not participate in that activity very much any more.

About the same time the department decided to reactivate a research project on grape and wine aroma constituents that we had originally gotten approval of in 1936. We were fortunate in getting Dr. A. Dinsmore Webb for this project. Dr. Webb had worked for me as a technician before the war and had just gotten his Ph.D. in organic chemistry. This research still continues.

A little bit later, around 1956, the industry felt that the dessert wine sales were not maintaining their pace. They felt this might be because they were processing them very rapidly and distributing them immediately. Sherries made in October were going onto the market in January. Ports made in October were on the market by March. These were clean, sound wines but they didn't have very much aged quality as produced. So the industry persuaded us then to hire a man to work on rapid aging, and that was how Dr. [Vernon L.] Singleton came to the department. So from originally one person before 1939, there were three before the war (Amerine, Guymon, and Castor), and then after the war, Berg and Webb became the fourth and fifth, and Singleton the sixth.

Finally Mr. [Cornelius S.] Ough came on the staff as a specialist. So there are actually seven in the department now doing full-time on research and teaching of enology. Professor Marsh is now retired and the fermentation work that's done in Food Science and Technology, as it's called now, is on the brewing industry, where they have Dr. [Michael J.] Lewis. But other than that and the work Professor Joslyn continues in Berkeley, the wine work has gradually shifted to the Department of Viticulture and Enology. There was no one time that you could say it ceased at one place because it still continues with Professor Joslyn at the Berkeley campus, but as he comes near retirement, I would guess that new projects will not be picked up there. Future new wine projects will probably stay in the department.

Of course, this involved quite a few changes in the department itself. Space, for one thing, gave out.

Amerine: The enology building had been built originally for just one person. While it was under construction, the word came through that we would add a chemical engineer and a microbiologist and do more teaching. A teaching laboratory was built on at one end, and a part of a wing on the other end was redesigned, while the building was under construction, to provide office space for the two new appointees. The actual design was changed! But that was about as much as we could handle. So that when Berg came, he had his office over in Food Science and Technology. It was the only place we could find a place to put him for his research. Much of Webb's early work had to be done in the chemistry laboratories. I was in the enology building with Guymon and Castor, and the viticulture people. Professors Winkler, Olmo and the viticulture staff, were on the far opposite corner of the campus in the horticulture building. So the department had problems of esprit de corps. When I became department chairman in 1957, Wickson Hall was under construction. And this was intended to bring the enology people as close to this building as possible and also bring Berg over from Food Science and Technology.

Well, it was lucky for me as department chairman, because then everybody was in one building, or we were right next to this building here. And there was a place for meetings. For the first time we had a teaching room where we could teach, and a lecture room. This, 1014, is the teaching room. It was set up this way for viticulture. And also for the first time we had an administrative assistant. So that the department changed from Professor Winkler's type of operation, where he knew the books and did much of the administrative work himself, to one where the department operated largely through an administrative assistant, committees, and staff meetings held regularly every month and so forth. This has continued to the present time. I would say that this department is a standard department in the College of Agriculture now. Most departments have administrative assistants; they, as we, have both research and teaching functions; they have regular staff meetings; and their staffs are oriented both to the industry they serve and to their own profession. A microbiologist is interested in microbiology problems, a plant physiologist in plant physiology, but they are also enologists or viticulturists. And this is the picture in the College of Agriculture today.

Amerine: I would say we are a little more successful perhaps than most departments for the reason that our relation with the industry is perhaps more intimate than the other departments in the College of Agriculture, even including the animal people, who are traditionally known for being closely related to the animal industry. I think that we have superseded them. Not even Food Science is as close to their industry as we are, both in the enology part and in the viticulture part. This is partly by design. We insist on our people going out and meeting the industry. The day that Guymon and Castor came in 1939, we took them to Fresno and gave them a two-week tour of the industry. Shortly after they came back from the war, when we were all three back together again, we took another similar trip again. These were conscious efforts at making sure that the staff saw the problems of the industry we were dealing with.

About 1958 there was a desire on the part of the department to get into the question of the automation of the wine industry, and the grape industry too. Dean [Roy] Bainer, who was then the chairman of the College of Agricultural Engineering, and I visited wineries throughout the state, and his comment was, Gee, he didn't realize how much the University was appreciated in his field. Every place we went, they not only listened to us but had ideas, and obviously we had a close relationship. And this has pretty well continued, I think, up to the present time.

My tour of duty as department chairman lasted from 1957 to 1962. It was pretty uneventful. Aside from necessary office reorganization and moving into the new building, no great changes occurred. I did work on student recruitment and the scholarship program was set up. I continued both my teaching and research during this period, but the course in enology was split so Webb and Berg each took a share. I was also teaching the sensory evaluation course in Food Science and Technology which I had designed.*

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*See p. 43 et seq.

EXTENSION WORK

Amerine: In addition, we had from about 1940 on an extension man in the department. We had first an extension viticulturist, and then later another extension viticulturist, and still later an extension enologist. As an example of the industry working for us, that enologist came to us by tacking a rider onto the U.S. Department of Agriculture's appropriation bill, which released funds for extension work in the wine industry. Before that, it had been an unwritten rule that no funds of the U.S. Department of Agriculture would be used on the wine industry. There was a man from South Carolina or North Carolina on the appropriations committee who controlled the agricultural appropriations. He regularly blue-penciled all funds for wine research, and so the United States Department of Agriculture, except for a short period in about 1936 or '37, never did any work on the wine industry until this rider was put in.

As a matter of fact, Beltsville had a winery in 1936. They were going to do some research work on wine at Beltsville. They had the equipment built and the tile fermentation tanks were constructed. When the Congressman from South Carolina found this out he blue-penciled the whole Beltsville appropriation until the Secretary of Agriculture promised not to spend any money on fermented beverages.

They also had given a little money in 1936 to Geneva, New York, the experiment station in New York. All that had to be washed out. They would give no money for wine research to the Western Regional Laboratory at Albany, California, during this period. All this lasted until we finally got an extension enologist. Then later, several bills have included funds for wine research, so that Western Regional Laboratory gets a sizeable appropriation for wine research each year.

Teiser: Does it do some now?

Amerine: Oh yes. They even sublet some of the research here. That large equipment that you saw between the enology building and Wickson Hall, that was built on federal funds received through Western Regional Laboratory, that were in turn given to the department

Amerine: here because we had the staff, the people who could do the work. So that because now we have three extension people in the department who are 50 percent of the time on the road, we have very good relations.

AMERICAN SOCIETY OF ENOLOGISTS AND TAC

Amerine: In enology also we've had quite good relations because about 20 years ago, which would be 1949, we had a former technician who was working in the industry. He was interested in setting up a professional organization of enologists. That was Mr. Charles Holden, Charlie Holden, who had been Dr. Castor's technician for several years. Charlie was working in Fresno in a winery, and he said, "Gee, I haven't been able to talk about technical things to anybody. Why don't we have a technical organization that would meet twice a year, and we could present papers on subjects of mutual interest?" And also he conceived of the society as having committees. People would be working on table wines, et cetera. The committees themselves would devise experiments, which then the people would go back to the wineries and do. That was the original concept for the American Society of Enologists.

Well, needless to say, the University not only supported it but pretty largely carried the burden of the work for a number of years. The meetings were held here for example. The journal was published here and still is. The executive secretary has an office in this building here now. And a number of us have been presidents of the organization. Mr. Winkler was president once. Professor Berg has been president. I've been president. George Marsh, from Food Science and Technology, has also been president.

So the relationship of the University to the Society has been close and intimate. The annual meetings were held here for some years. Later the meetings were held at Asilomar, Santa Barbara and other places. The organization is now quite independent of the University. It's true we do a lot of work for them but the board meets regularly. They've developed a lot of expertise in how to run a big organization. They have a big budget, and....

Teiser: Do they have representatives from most of the wineries in that organization?

Amerine: Yes, almost everybody in the industry that's anybody belongs to the American Society of Enologists, and a good many in the East and some in foreign countries. Their journal has developed a reputation for itself. This is the 19th volume of the journal. Our technical articles in the journal have helped us keep close relations with the industry.

The wine industry itself has a number of subdivisions. Besides, the Wine Institute has what is called its Technical Advisory Committee. This is composed of technicians, rather a limited number of them, and University research workers. They meet twice a year to advise the Wine Institute on needed legislation and technical research. For example, recently they lowered the permissive alcohol on sherry from 19-1/2 per cent to 17 per cent. That was done on a Technical Advisory Committee recommendation. It eventually became the recommendation of the Wine Institute to the Internal Revenue Service, who recently changed the regulation. So we've had a large number of contacts of that kind. After the war...

Teiser: Are the members of the University staff mostly on the Technical Advisory Committee?

Amerine: Most of them go. Most don't go very often any more because...

Teiser: I should have put it the other way. Is the Technical Advisory Committee made up mostly of University people?

Amerine: No. It's made up mostly of industry people, with University people going. They rarely do anything that we disapprove of. Once in a while they do, and then we voice an objection. They're looking at it from the commercial point of view, of course, which isn't always the best point of view for new legislation.

POST-WAR PUBLICATIONS

Amerine: After the war, the bulletins went out of print very quickly. Bulletin 639, which was the table wine bulletin,* first, the brandy bulletin** next, and the dessert wine bulletin*** went out of print about 1955. Dean [Paul F.] Sharp, assistant dean of the College of Agriculture and director of the Agricultural Experiment Station, and Joslyn and I held several meetings, and it was decided then that we would not go back into the bulletin series. The bulletins really contained research results, but they had also had a lot of how-to-do things. With the new information, they were going to be very expensive to put out as bulletins. This was the time when the University was putting out lots of bulletins, and Sharp's publication budget was running a year behind.

So it was decided to set up in the Agricultural Experiment Station a series of books which would be sold at cost, or would be sold at a reasonable price. These would cost the Experiment Station much less than the bulletins. The first one of this series was the table wine book of Amerine and Joslyn in 1951.**** This is just now (1969) going into a second edition. I'll come to that in just a moment. This was followed by a lemon book and several others. The most successful was the wine book. It was a good bargain at $4.50. It saved the University some money. It had a lot more prestige than a bulletin would have had.

It was very well designed. It was designed by a very good man, and so it had a lot of typographical things that were very good. And it was pretty well organized. Mrs. [Mary B.] Rubo was the editor at the Agricultural Experiment Station at that time, and she was a genius in editing. She also had edited the wine bulletins earlier. She did not make mistakes. When she edited a manuscript, it was edited, and there was no doubt in the printer's mind what to do, and so

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*Appendix I, #24.

**Appendix I, #27.

***Appendix I, #26.

****Appendix I, #74.

Amerine: forth. There were essentially no spelling errors in that entire book, and only one in the index, or something like that.

At any rate, in order to protect Joslyn and I on the future printing of the dessert wine book, Sharp set up an Experiment Station project for the dessert wine book. I guess the last of the series was the dessert wine book because it was a project. The Experiment Station was committed to publishing it, but it was not published until 1964. By that time the price had gone up to $7.50.* But it again saved the University a lot of money because a bulletin of that size would have been very expensive to do and the Agricultural Experiment Station would have gotten nothing for it. Neither of these books gave any royalties to the authors.

Teiser: Would you have written at such length if you had been doing bulletins?

Amerine: Well, I don't think we could have. I mean, it just would not have been possible. Also bulletins would not have had the stature the books had, as far as the industry was concerned.

Just to finish the University series of books: The table wine book went out of print about 1961, '62 maybe. So it was decided that we would do that again, but we would not do it in the Experiment Station, we would do it in the University of California Press. By this time I had been a member of the editorial committee of the University Press, among other statewide committees that I had been on, and so I knew my way around. I knew [August] Frugé and his staff. And also I had lobbied Winkler's textbook, General Viticulture** through the press in 1961. It had been very successful. So we had no difficulty then in getting the University Press committed to publishing the table wine book. Unfortunately, it grew like Topsy, and it's now about a thousand pages, as near

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*Appendix I, #207.

**Winkler, Albert J., General Viticulture. Berkeley and Los Angeles: University of California Press, 1962.

Amerine: as I can tell. We're in the page proof series now. I should know the final size within the next week or two. It will be undoubtedly a standard work on table wine production. I'm sure we will not publish that kind of a book again. It will cover about everything that we know about table wines as of date.

Joslyn was born in '07, so he's 62 or 63 now and I was born in '11 and will be 58 this fall. I don't think either of us would like to contemplate another thousand page book in our 60's. If we do, it will be after we retire as something to keep ourselves amused. At least that's my theory.

So the University has got its money's worth, I would guess, out of the bulletins and books that we have published. And I was just in Chile two weeks ago, and the specialists there said, "Well, there isn't any other book like Winkler's Viticulture or like your table wine or dessert wine books, or like the Technology of Wine Making," which I'll come to in a moment. "We don't have any other comparable sources of material; that's the only place we can go."

Teiser: Has any of them been translated into any foreign language?

Amerine: Yes, Winkler's book has been translated into Spanish and is pretty widely distributed in Spanish. Only parts of the first edition of Table Wines have been translated into Russian. We've had several people offer to translate it into German but by reason of the length, and my unwillingness to correct the translation (with a long translation that would be a major work, although I get along in German fairly well), we have not encouraged them too much. And I doubt if it would have any interest in Italian. It would have in Spanish I think if somebody would do it.

Before the war, Professor Cruess had published a small wine book, which included some travel notes that he had made in various countries. It was called The Principles and Practice of Wine Making. It had been published by the Avi Publishing Company.* This

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*Cruess, William V., The Principles and Practice of Wine Making. New York: Avi Publishing Co., 1934.

Amerine: was a small company which published a magazine called Fruit Products Journal and American Food Manufacturer, which Professor Cruess often published in. Some portions were not very technical because, as I say, it included some of his 1933 travel notes: what he saw in Cognac, what he saw in Italy, what he saw in Burgundy and so forth. He published a second edition in 1947 which was larger and had a slightly different arrangement, but again had notes on his trips abroad and had some typical Cruess directions on how to do things. He was very good at these.

Later the Avi Publishing Company had been acquired by Donald K. Tressider. He had wanted to develop the Avi Publishing Company into a major publisher of food journals, which, I must say, he has succeeded in doing. They must have published 75 books on foods, but at that time they had only this one, Cruess' book. It went out of print about 1957. Cruess was retired by this time and it needed to be re-done and brought up to date. It also needed a new format to fit in with the new series which the Avi Publishing Company was developing.

They weren't interested in travel books on wines; they weren't interested in anything that wasn't technical. They wanted technical publications that would be sort of manuals for the brewing, wine and food industries. They never did do a brewing one; I don't know why. But they've done several on the canning industry and various books pertaining to the baking industry. They've done a good many different kinds now, as I've said altogether some 75, I suspect.

Cruess came to me then and asked if I would collaborate on the new one. And this was sort of a Hobson's choice, because if I did do it it would take a lot of time, and if I didn't do it, Professor Cruess might have to turn to somebody in the industry, who wouldn't be familiar with the literature. And I say this with modesty, but it's a true statement of fact, I didn't know anybody in the industry that had the command of the literature that would help Cruess do something worthwhile. And I was anxious, since he was a good friend of mine, that what was published should be worthy of his own world-wide reputation.

So between the three different pressures, I then came into the picture and the book then became Amerine and Cruess. And acquired a new name. It was

Amerine: called The Technology of Wine Making.* And ran for some 600 odd pages at $25, and it went out of print in five years, much to our amazement. The second edition of that was then published in 1967, as Amerine, Berg, and Cruess.** I then brought Berg in the picture, realizing that Cruess couldn't participate actively in its production. In fact, Cruess did not participate very much in the second edition. He used to send me occasional notes, but he had had a small stroke by that time and had difficulty in writing. So I would get little typed cards from him with pertinent material. We told him what we were doing and we read parts of the manuscript to him and asked his opinion on various things. Other than that he did not participate in that edition.

Teiser: But he was very pleased about it.

Amerine: Well, I'm sure he was, because the second volume was even better than the first one, and did represent a contribution. Many of his ideas are still in the text, things that he did. The yeast chapter, for example, pretty well represents his style of writing if you read it very carefully. It's obviously changed in some things, but not in ideas, and as soon as you start to add things then the style begins to change.*** But there are many things in it that are still Cruess' own style of writing.

I might say that he had published in 1934 a small circular with Joslyn--Cruess and Joslyn--Curcular 88.**** It consisted of notes on wine making practices. It was supplemented by the Amerine-Joslyn, Joslyn-Amerine bulletins, which were more scientific--I shouldn't say more scientific--which were more highly organized, and had a great deal more of the literature in them. Circular 88 was simply "This is the way it is, boys."

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*Appendix I, #163.

**Appendix I, #245.

***See also p. 93.

****Elements of Wine Making. University of California, Agricultural Extension Service, November, 1934.

Amerine: Bulletin 639* was: "Well, this is the literature; take your choice. We think it's this way, but it could be that way." It was much more the principles than it was the practices kind of thing. Our books have gradually got that way. They are much stronger on principles than practices at the present time. It is principles that they're much more likely to need. Well, anyway, so much for the books.

There is one other wine book that I should mention. For many years I had taught an introductory course on wines, Viticulture 3. After Dr. Singleton came in 1957 I asked him to help in the course (about 1959 or 1960). The lecture notes for this course became Wine: An Introduction for Americans.** This is the most popular of my books. It is now available both as a hard back and a paper back.

Well, I am not sure whether it is the most popular. Professor Marsh and I wrote a small book on home wine making for Wines & Vines. Since it returns no royalties we do not know how many copies have been sold.***

RECOLLECTIONS OF PEOPLE

Amerine: I think I perhaps ought to say a little bit about my recollection of Bioletti.**** Bioletti I only saw a few times in class in 1930, and then when I came in '35, I talked to him a few times. I don't think that he and Winkler envisaged the same kind of wine research. He saw a very large winery-type of research, which I'm sure was not in the cards. It was very

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*Appendix I, #24.

**Appendix I, #253.

***Appendix I, #178. By 1970 it had gone into a second edition and some 8,000 copies had been sold.

****Frederic T. Bioletti, Professor of Viticulture and Viticulturist in the Experiment Station, who came to the University in 1889.

Amerine: lucky that the University escaped that kind of thing. I've just seen such a building constructed in the Year of Our Lord 1969, in Chile, which is a disgrace. It cost a huge amount of money. There is no place for teaching, no place for research. It's just a place to operate a big winery, and teach people cookbook style how to turn faucets on and off. And this has no place in the University of California. It doesn't even have a place in the state colleges. It might in some vocational school, or something like that, but certainly modern technicians should not be trained that way.

Well, anyway, he was primarily a viticulture man. He conceived of himself as a wine man, however, and his most popular book had been a little pamphlet on home wine making published during Prohibition. And I don't know how good a taster he was. He had tasted at the State Fair in '36. That was the last time he had tasted at the State Fair. And I'll come to tasting in a few minutes. At any rate, he was a highly opinionated man, and he continued to work a little bit with Professor [Harold P.] Olmo. Olmo had come on the staff to work on grape varieties, breeding work and so forth, in 1934. I guess Bioletti died about 1938, something like that. In order to help Winkler and me, we brought onto the staff in 1936, for about 18 months, a Mr. Twight, Edmund H. Twight. Twight had held a position in the College of Agriculture about 1906 or '07....

Teiser: I ran across a 1903 reference to Twight being appointed to the University to establish "good wine making practices" or something of that sort.

Amerine: Oh, I didn't know he went back that far. But in 1906, he had a title in enology. He was an Assistant Professor of Enology, I think, or something of that sort. Twight was an extremely interesting man. My definitive in memoriam of him is in Wines and Vines after he died a few years ago.* I think it is one of my better pieces of writing, because I probably knew him better than anybody else. I won't repeat that

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*"Edmund Henri Twight - 1874-1957." Wines and Vines 38 (5): 26-27; 1957.

Amerine: information; it's in the literature. He was a very complex person but did have a pretty good palate and helped us in tasting. We had 500 or 600 samples coming in every year and neither Winkler nor I had had any great amount of experience in critically tasting wines. So he immediately helped us to establish some norms. But I must say we did have industry people around too at this time. Mr. [Almond R.] Morrow was supposed to be the best taster in the industry. He came to Davis at least twice during this period of time. Mr. Lanza, Horace Lanza, who's still alive, who had a number of wineries and was reputed to be a good taster, came to Davis. And we had industry groups come in in 1936 and '37.

Teiser: Were these men good tasters?

Amerine: Yes. At least they had experience in finding bad wines. Perhaps they would not be what we'd call top-notch tasters today because the problems of tasting today are much more complex than they were at that time. But at least they could recognize bad wines and eliminate them. That's what primarily needed to be done at that time, was to weed out the wines that were not coming up to the standards and find out why they had to be weeded out so as to prevent it happening again. Was it because of the condition of the grapes or was it because of poor fermentation practices? And that was the primary job with all these grapes coming from all over the state here. We didn't want to eliminate any good ones, and yet we didn't want to recommend any variety that produced bad wines.

Teiser: Were these wines that came to you from commercial [wineries]?

Amerine: No, we made the wines here, but the grapes came from every place, and we made them. So essentially the wine did come from different districts, but it was all made here. That was a very early decision that was made, that we'd never get any place if we depended on other people to make our wine. It'd be made by so many different methods at so many different temperatures at so many unknown degrees of maturity that we would just simply not get any place. And so all the wines that the University has made, 20 thousand or so by now, have been made here under conditions where we can tell you when they were picked and how sweet they

Amerine: were, and what the analyses were, and what the fermentation conditions were, what yeast was used, and all the conditions, so that we've eliminated that variable as much as we can.

Well, Twight got along very well, I think, here, and he was quite happy here. Unfortunately, he decided that some Italian grape growers of Guerneville needed help, and he left us without telling us until after he'd resigned. Davis would have been a good place for him to finish his career. He only had three or four more years to go. And we had given him a nice office. He translated French very fluently and he kept up on the French literature as well as giving us a feedback to the pre-Prohibition literature, which none of us had a very good command of. Not even Cruess had such a command of that literature.

Twight had been trained at Montpellier, and he knew all the names. If you said Semichon, "Well, yes, I had Semichon in class." Or, "Semichon was a classmate of mine." And so he was very valuable to the staff in helping us to set up tasting, and also in familiarizing us with the European situation as far as grapes and wine were concerned. And I'm sorry that he didn't stay. But by the time he left, which was around 1938, we had acquired some expertise in this field.

WINE JUDGINGS

Amerine: Starting in 1937, Winkler and I and Cruess, Joslyn and Marsh had judged at the Sacramento Fair. In 1939 Marsh and I had judged at the Golden Gate International Exposition on Treasure Island. This was probably the best tasting that we'd had in California. It was better organized. The State Fair tasting was held during the fair. It was crowded and dusty and it was hurried. The one at Treasure Island was done on successive week-ends in a quiet and peaceful surrounding. I was chairman of the jury. We set up our own rules, which the State Fair had done at Sacramento, but which we did to suit our needs. It may have been the best state-wide tasting that we've had since Repeal.

Teiser: Was a record of that kept?

Amerine: Yes, there was a report that came out in Wines and Vines magazine. There were two grand prize premiums; there were 30 gold medals, 70 silver medals and a number of bronze medals. And a number of wineries didn't get any prize.

Gradually the State Fair judging, although I participated for some years before the war and again for several years after the war, tended to get more and more over toward giving a great many prizes. This may have been partially my fault, because I brought industry people into the State Fair judging. In fact, I felt that the University was too closely associated with the State Fair judging, and it was my intention that the University eventually would get out of the State Fair judging completely, and that the industry people would have enough experience to do it.

As a matter of fact, that was the reason that I stopped judging about 1953 for several years. It was because I wanted to give a good example to the other University people that this was a job that the industry itself should really do and that we weren't gaining very many kudos for doing this work. In fact, we were getting criticized for it, frequently not our fault. And we were not learning enough from it, because we were seeing the same wines year after year, the same kinds of wines, and so the law of diminishing returns came in.

Well, there is no more State Fair judging so that that's a thing of the past, and perhaps it's just as well. A different kind of judging perhaps needs to be done today. I would suspect that a State Fair judging would not come back very soon. Furthermore, the industry began to "use" the judgings as they became more prestigious. The more we succeeded in making the gold medals mean something, the more the industry advertised them all over the country, and the more the demand was for more gold medals. So in the long run, I think that we were well-advised to get out of it, although we did continue to give them some technical assistance. And two or three of the staff who liked to do it continued to go until it died last year or the year before last. Probably judgings will come back some day in a different format: local affairs, less frequently, occasional international judgings, et cetera.

Teiser: There is a question that comes to mind about the state fairs. I believe there was a good bit of criticism at one time that the wines judged were submitted by the winemakers and not just bought from the shelves.

Amerine: Yes. You could write a whole book on the State Fair judgings behind the scenes and in front of the scenes and so forth. The rules for the fair were actually written by the Wine Institute, but since the Wine Institute was composed of almost all the wineries of California, obviously they had great difficulty in writing rules that everybody would agree to. And this particular rule, the rule about how you pick up the wines for the State Fair, was one that caused a lot of headaches.

I suggested, and they followed, one solution. One solution was to pick up wines that were available in, I think it was, 1000-case lots or more in the channels of trade. And we gave what we called First Premium Award, Second Premium Award and Third Premium Award, the theory being here that anybody who put out a thousand cases and was better than the others ought to deserve a First Premium Award, Second Premium Award and Third Premium Award, that that's the way they were judged. Whereas the others, they only had to have 50 cases of wine, 100 gallons. And where would you find Souverain's Johannisberg Riesling, for example, in the market if you didn't know where to go? If you ask Souverain where to go, he could just as easily send down some special wine at some particular place, so that that wouldn't solve the problem at all.

In other words, where you make your minimum allotment 50 cases or 120 gallons, you have to know where to go get it, because the state of California is a pretty big state. There are several thousand liquor outlets in California. Second, it might not be fair to go and pick up.... Suppose you did find Souverain Riesling. It might have been sitting in the liquor store for two years or three years. It might be spoiled completely, and yet it would be at the fair, and they would be getting a prize on it which they didn't deserve--in other words, they wouldn't get any prize. So then we got retired Internal Revenue Service people to go and pick up the wine at the winery and physically verify that

Amerine: they had the 50 cases. Presumably they did, and I think this got away from most of the criticism. So in the last few years, the wines have been picked up in this way. I thought the whole thing was a tempest-in-a-teapot sort of thing. It never affected us in any way because, as I say, the rules were made in San Francisco and Sacramento. We simply abided by the rules as near as we could.

Now, we did make some rather fundamental changes however in State Fair judging. In order to get away from any possible criticism, we held three judgings in Sacramento in the latter years, the last time I was chairman, and this was continued on. We did two things: one, we held a tasting for judges, that is for prospective judges. If you wanted to be a judge, you had to pass a test. And we did this by a threshold and other tests. Could they recognize acetic acid? Could they recognize sugar? and so forth. That was one kind of test we did. And could they recognize Cabernet? Could they recognize muscat? and so forth.

And then in order to make the judging operate as fairly as we could, the judges were divided into four classes so that they did not have to judge a great many wines. And they saw all the wines that got prizes three times. First there was an elimination. They eliminated all the bad wines. They didn't have to eliminate any if they didn't want, but if they wanted to, they could eliminate them. It took three out of the five judges to eliminate it. Then, in the second step, the wines were brought back with new numbers, and they were required to rank them: one, two, three, four, from the best to the worst. The average ranks were then calculated. And then they came back a third time with the ranks on them. In other words: this sample was ranked best, this sample was ranked next best, this sample was ranked next best.

Now what kind of medal will you give it, because the rule of the Fair was, in the regular judging (not in that bulk thing that I spoke about) the rule was that the best wine didn't necessarily have to get a gold medal. It could get a silver medal, it could get a bronze medal, if it wasn't worthy of a gold medal. But by making them go through the ranking system, then it was obvious that if everybody put this one first, and there was no question about it,

Amerine: then it would be easier to give the gold medal. And this is exactly how it turned out. But if the judges were quite confused, if the rankings did not show much differentiation--sometimes in a small class of five wines there wouldn't be much difference in the ranking and perhaps there should not have been, and in that case, they might give two gold medals or they might give two silver medals or they might give two bronze medals. So this gave them a great deal more information, and we never had any criticism of how the judging was done at the Fair, or who did it. In fact, we only got praise for how the judging was done.

There is a magazine called Laboratory Practice, an English magazine, which two or three years ago had a series of articles on methods of tasting different commodities in different parts of the world, and Mr. [C.S.] Ough and I wrote the one on the California methods of wine tasting, which I discussed at some length: the reasons for it, and how it actually operated.*

Teiser: Has the wine industry ever considered having the kind of tastings that the Canners League has? Their cuttings?

Amerine: Yes, they have, and I think it might be a good thing, although as you know the Canners League cuttings have had to be somewhat modified because they found when they used industry judges some people were more critical of color and they would make their comments on the basis of color. Other judges would make it on the basis of size and so forth.

So now they have judges who are making comments--at least in olives they do this, and I believe in other commodities too. One judge judges all the samples on the basis of color. Another judges them on the basis of uniformity. Another judges on another basis. And so you get three sets of comments on the olives. And of course, you get the feedback on this and nobody else does. You're the only one who knows whose sample it is. They all see it, but the producer is the only one that knows this is his sample.**

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*Appendix I, #211.

**For further discussion of judgings, see pp. 77-83.

SENSORY EVALUATION COURSE AND BOOK

Amerine: This might be a good time to say something about another thing. When Food Technology moved here in 1950, we had done a lot of tasting at that time. I had published several papers already. And we had gotten the mathematics department interested in some of the statistical problems of analyzing results of sensory evaluations of wines. And also at the same time Professor Mrak had persuaded the industry to spend some money on consumer testing. Mr. [E.F.] Filipello was brought here for this work. Since we didn't have any space, he was located over with Professor Berg in Cruess Hall.

And so when Mrak saw the kind of work that he was doing, he came to me then and said, "Well, we must do something like this in foods, in our own department here." So Miss [Elie] Hinreiner was brought onto the staff over there to begin work on consumer testing. Mrak had also been exposed to sensory evaluation during the war in his work with the Quartermaster Corps in setting up new rations for the Army and Navy and so forth--the so-called "C" and "K" rations. The Quartermaster Corps laboratories in Chicago had developed some methods of testing consumer reaction and so forth.

So, some time after 1950, we held a series of seminars, and about 1957, perhaps, Miss Hinreiner and I organized a course on sensory evaluation of foods. Unfortunately, Miss Hinreiner then got married, and I taught the course, and have continued to teach it to this day. The course grew slowly, but people from Enology, from Home Economics and from Food Science and Technology took it. And so by 1963 or '64, we had several people here working in this field. Miss Hinreiner had been succeeded by Miss [Marion] Simone. Food Science and Technology had hired one of my students in the course, Mrs. [Rose Marie] Pangborn, to set up research on dairy and other products. And, of course, we had Filipello working actually over there but on wine industry funds, and I was working over here.

And so it was decided, after we taught the course I guess five, six, seven times, to publish a textbook on it, and that was the origin of the book Principles

Amerine: of Sensory Evaluation of Food, which was published by Academic Press four or five years ago. It was written by Amerine, Pangborn, and [Edward B.] Roessler.*

Teiser: Do you mind if I take a couple of pictures?

Amerine: No... That ran to over 600 pages and was the first English book in the field. We had the pleasure of beating our competitors in the field. There was one in Polish and there was one in Swedish and there was one in Japanese, but there was nothing in English until that book was published. And I was just told by the editors last Thursday that it will be out of print by the end of next year, and so we have to contemplate a second edition, which is pretty good for a new book in a new field.

Now the class has 20 to 30 students each year. Mrs. Pangborn also teaches. We've brought in Dr. [Morris H.] Woskow to work on the psychology of human response, and he's been helping in the teaching the last few years. So we have a psychologist and a biochemist and foods people all working on this course. And I guess Davis would be considered, if you were going to do graduate work in this field, the place to come now. I don't know of any place where you'd get better training than you'd get here. We had Dr. [Herbert] Stone, for example, who got his degree here and has gone to Stanford Research Institute. He is their expert in sensory evaluation of foods now. So I think this is a program that has developed very well.

UNIVERSITY ADMINISTRATORS

Amerine: Perhaps I ought to say a little about the University administrators as I remember them. The first one I remember, of course, was Dr. [Walter L.] Howard, who was the director here at Davis. He was originally a horticulturist, and I got along with him very well because I was originally a plant man myself. He wasn't particularly interested in wine, but on the

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*Appendix I, #225.

Amerine: other hand he liked wine. In order to improve our image on the Davis campus, starting in 1936, he had organized a little Wine and Food Society group, which still continues, which included all the senior people around the campus, all of whom still belong. Practically nobody has ever resigned from the group. It's a prestige group to belong to now because they've been going so long. But this gave us an immediate campus response. They found out that we were sober and that we were doing good research, and that we knew quite a bit about wines which they didn't know. This, of course, improved the image of the department on the campus.

And, of course, Professor Winkler had been here since '22 also. So he was a senior member of the staff and had been chairman of the budget committee and so forth. So he knew his way around. Then we had [Stanley B.] Freeborn, who had gone to Berkeley as assistant dean, and Knowles Ryerson succeeded Howard as the assistant dean here.

I got to know Ryerson before he even came to the campus. He gave me some letters of introduction when I went abroad in '37. I'll talk about these trips abroad in a few minutes. Ryerson was gone during the war, but he came back after the war. When this became a general campus, he moved to Berkeley as the dean of Berkeley. Freeborn moved to Davis as the first provost, later the first chancellor at Davis. Freeborn was interested in wine, more than Ryerson I think, and knew a good deal about research since he had done a lot of research himself. And he supported the research here quite well.

Of course Hutchinson, Claude B. Hutchinson, was really responsible for my being here and responsible for the enology building, and also responsible for some of the construction of Wickson Hall here. He's still a good friend of mine and still very much interested in wines and the wine industry. He said, "Well, we're the only university that's going to have a department like this. We'd better have a good one." And so he gave special attention to it. I think we have to give him quite a bit of credit for that. He took a great deal of interest in appointments, for example, in our department, and in other departments, too, but particularly in this department.

Amerine: Freeborn was followed by Mrak, of course, and Mrak and I for the last ten years, we couldn't have had a better relationship. That went back to when I was a student in Berkeley. And the fact that I taught in his department helped. The course in foods was given in his department, not this department. To finish up that department also, I had organized a course called Viticulture 3, which was a sort of introductory course to wines, which had become increasingly more popular. In fact, last year it had 261 students. At that time it was, I think, the largest course in the College of Agriculture here.

The people in Food Science saw that this was a good thing, so they asked me to help organize an Introduction to Food Science course, which I helped organize and which I still teach. As a matter of fact, while I'm gone this fall, Mrak will take my part of the course. Professor [George F.] Stewart and I teach the course. But it's in Food Science and Technology, not in this department. We also had a lot of cooperation, I think, at the regents' level because no regents' meeting came to Davis while Mrak was chancellor unless they came to visit the enology building. So we had a good deal of help and favorable relations. Of course, first of all, we kept our skirts very clean here. Nobody ever abused wine, as far as I know.

THE UNIVERSITY AND THE WINE AND GRAPE INDUSTRY

Amerine: The department was never accused in any way of any favoritism in the wine industry. No matter whether they were the largest people in the wine industry or the smallest, they got equal attention, or they got as much attention as our time and experience and energies would permit.

Teiser: When they brought their individual problems to you?

Amerine: Yes, either they brought them, or we sent somebody out to find them out. In many cases, we found the problems. They didn't even know they had problems until we would send our extension people out, or in the early days I went out, or Mr. Berg went out after the war, and actually went through their plants and

Amerine: showed them what they were doing wrong. Or if we didn't know what was wrong we brought samples home and found out what was wrong analytically.

We had other good things going for us public relations-wise, I think, too. The industry itself needed the prestige of the University. After all, they were resurrected out of the bootlegging industry, whether they like to think of it that way or not. So the fact that the universities, especially the University of California, were giving them first-class attention (and we went to all the meetings and so forth) certainly didn't hurt their ego in the least. And I think they could feel much more a grown up industry. Now that wouldn't be true today. They consider themselves another part of the chemical industries today. And they're proud of the University and so forth, but they're also proud of themselves, which they should be.

Teiser: You have supplied by now many of their people, have you not?

Amerine: Oh, yes, many of the people have come from the University and so forth, and through the Society of Enologists and so forth. And all these regional groups--I didn't finish--T.A.C.* is only one of the kinds of committees that Wine Institute has. They have regional groups in various parts of the state, which we talk to regularly, and so forth. We have a large intercommunication going, perhaps more with the wine industry than with the grape industry.

One of our problems with the grape industry is that it's so large and diffuse that we don't know who to communicate with. There are something like 18,000 grape growers in California. And this is not a group which you can easily focus on. There are only about 200 wineries in California. This is a group that is much more manageable. Practically all of the producers of California wines are on speaking terms with us, because we know them that well. So we've really covered the field in the wine industry, which we can't hope to do in the grape industry.

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*See p. 29.

Amerine: Well, so much for the industry and University people. I would say that the department has been well supported. The volume of research that has been published has been impressive too. The books and bulletins and Hilgardias and large number of articles that we've published on a wide variety of subjects have given visible evidence that we are there. A few years ago, I insisted that we make a reprint collection for the department, which now occupies a whole shelf and gets bigger every year. This is another indication that the department is still productive and becoming more productive.

RECENT CAMPUS AND UNIVERSITY RECOLLECTIONS

Amerine: Perhaps I ought to say a little bit about my relationship to the campus. As a member of the University staff I went through the usual chairs that new members of the faculty are put upon. The University Welfare, which is a nebulous committee. But because of the books, I was put on University Press fairly early, which is a state-wide committee. And then after the war, I was on any number of different committees.

I was chairman of the Davis Educational Policy Committee and then chairman of Educational Policy statewide, and then chairman of the faculty here. I was chairman of the faculty when [Clark] Kerr was fired, so I participated in the fireworks around Kerr's dismissal, at the regents level. I must say it was a very uncomfortable experience.

Kerr was and still is a good friend of mine. Just two months before he was retired...fired...whichever way you want to put it...the Paul Masson wine company gave a fiesta, I suppose you'd call it, in honor of the University staff at their new winery down near Soledad. They sent a special plane to Sacramento to pick up the staff, and they flew Kerr and I in a private plane from Oakland down there in order to have this luncheon, with the supervisors and representatives of many wineries of California, to say thanks to the University for the help which we had given them on the varieties of grapes that they should plant down there, and the design of the winery and so forth. Of course, Paul Masson was milking

Amerine: this for its public relations value too, but the fact that Kerr went down and gave a speech was an indication that he was sensitive to the needs of the wine industry, and appreciative of what they were trying to do to say thank you to us in their own way. And I didn't mind participating in it, as I say. It was nice. I don't know of any other department that has been moved in one fell swoop to some place by a private plane and so forth, to get to Salinas of all places and then have buses there to take them to Soledad.

Well, any way, I saw Kerr a lot during that year when I was chairman of Educational Policy because I went not only to the meetings of the Academic Council--for those two years I guess it lasted--but I also went to the regents' meetings when I had to, and that was the time when the ten year all-University academic plan was being prepared, which we had investigated. It was also the time when the new engineering plan for the University was presented--these had all gone through Educational Policy. The academic plans for Santa Cruz, Irvine, Los Angeles, Davis and San Francisco all went through Educational Policy at that time, en route to the regents.

I was sorry to see Kerr go, especially so unceremoniously, and of course this created very wide problems for the faculty, because the faculty felt they had to protest, and did. Our protest lasted for three successive meetings on three successive days of the [academic] senate, at which for the first time 500 people were present. They were in a belligerent mood, each of the meetings being two hours. But they came off pretty well because we had devised a format that we would meet for two hours and then recess, and this kept pressures fairly low so that by the third day we did condemn the regents. I don't think the regents cared whether we condemned them or not. The faculty condemnation didn't seem to affect them.

We were the only campus, however, I think who really honored Kerr properly. We held an all-University dinner for him on the campus later that spring, in which we had two of his old friends talk, and Mrak talked and the students and the faculty participated. And he'd held meetings with the students during the daytime and so forth. In fact, Kerr appreciated that very much. It was the only campus that had the imagination to think of something

Amerine: that wouldn't be too obnoxious to the regents, who of course didn't want any ground swell to develop. Apparently Kerr had made some sort of arrangement that he wouldn't, and he didn't, as a matter of fact. He still hasn't, as far as I know. As far as Kerr is concerned, he hasn't said a word about the University since the day he left as far as I know. He certainly didn't say anything on the power structure and so forth. Anyway, he's probably got plenty to do at Carnegie. He's on this Vietnam Committee now, so I suppose that's....

In one way, I'm glad I went through all the chairs, as they say, and did the Committee on Committees and Educational Policy and other things like that. I think all members of the faculty, if they have any talents at all, should do this sort of thing because it is the only way of having strong faculty organization who can advise the administration well. The worst thing for an administration is to have a weak faculty. And the best thing for the administration--I know the administration doesn't agree with this, but my experience is and my belief is that the best thing for the University is to have a strong faculty group where there's a good esprit de corps and a large amount of communication.

I'm happy to say that my two successors as chairman of the Davis division have both carried on this communication business. I started having meetings with the chairmen of the committees regularly. Well, this year on the Berkeley People's Park, et cetera situation, that was the committee that did most of the work. That was how we communicated with all the other committees, and it actually turned out to be a life-saver because the resolutions coming from that senior a group had a lot more meaning than the ones that came from some wild out yonder department. And they carried the Davis division. I would say I disagree with the resolutions but at least they were resolutions that you could live with, compared to some of them that you couldn't have lived with.

Well, just to summarize, the over-all University picture has changed remarkably, at least with respect to the wine industry.

THE CURRENT WINE INDUSTRY

Amerine: The over-all wine industry picture has changed remarkably. One, the industry is reasonably prosperous today. They have homes in Palm Springs. They have private planes. They drive nice cars, and so forth. This has come about through two things, of course, the increase in the quality of California wines, which has enabled wines to be sold at higher prices. We're selling wines now at $40, $50, $60, and $70 a case and more. And this increased quality has led to increasing acceptance of California wines in all parts of the country. You'll find them on wine lists of fancy restaurants in New York as well as San Francisco, Los Angeles, Chicago or New Orleans.

And, of course, this has had a feedback to the University almost immediately because this, among other things, is what has excited the industry about planting good varieties of grapes. So we have spent the last two or three years reaping the dividends of the research we did before the war. The recommendations that are now made are based upon the research that we did at that early period. At least, that's where we started the research. And nobody would think of starting a winery or planting a vineyard unless he came, as I said earlier, and found out which varieties should I plant? And then we ask him, "Well, what kind of wine do you want to make?" and we can show him chapter and verse, and he goes away happy.

So we have actually seen people calling long distance from New York and all that sort of thing, regularly, and asking us our opinion. We've also succeeded in getting into the 13 counties that have grapes in California a good farm adviser who has had Davis training and knows the Davis situation backward and forward. In addition, we bring them here every year, in case they don't know the Davis situation, to meet with the staff, and the staff tells them the new research they're doing and so forth. So we not only have eyes and ears and hands as an extension of the department, but we have them in 13 counties to feed us information and feed them information. This has helped us a good deal also. The industry is also centralized much more. We had 700 wineries in 1932, and now we have 194 or 204 or something like

Amerine: that. Many of these are really little tiny family wineries with very small production, so we've probably only got about 70 wineries that are important commercially in California at the present time. This has made our job somewhat easier and has also enabled the industry to hire people of higher caliber.

There are at least two people at Gallo, for example, that have Ph.D.'s. One of them is one of our students from here, Dr. [George] Thoukis. He's one of the chief men in their research staff in Modesto. There's a couple of people with Ph.D.'s at Italian Swiss Colony research laboratories up at Asti. Dr. Filipello, who did all of that work here in consumer research, is now employed by them there. Their director of research is a graduate of the University. He got his master's degree at the University here at Davis. The director of research in Modesto is a Berkeley graduate, Charles Crawford, one of Professor Joslyn's students. So we have an industry that's much more sure of itself.

Teiser: You also have people in smaller wineries such as the younger [Louis P.] Martini.

Amerine: Yes, and his new assistant, Mr. [William] Fuller, of course, just got his master's degree three years ago. Yes, so it's hard to go into a California winery now and not find somebody we know or somebody who knows us immediately, even in the public relations staff frequently. And then the industry now, since they see the great success of Gallo and Allied [Grape Growers] in developing technological staffs, realize that they have to do research as well as the University.

The University can't possibly do all the kinds of research that they need to have done. And we've encouraged them. In fact, I've written at least two or three articles on the place of research in enology. And my favorite quotation, which the industry now talks as if they had discovered it is, "We don't do research because we want to; we do research because we have to." And this makes sense to them because they know their competitors are doing research. This has had a good effect on increasing salaries of technicians. They don't come to the University now and say, "Can we get a technician for

Amerine: $300 or $400 a month?" They come to the University and say "What will we have to pay in order to get one?" Almost any price is cheap for them if they get a good technician.

Teiser: Didn't there used to be some traveling technicians who went from small winery to small winery....

Amerine: There still is. The Scott Laboratories, which was the old Berkeley Yeast Laboratory. They do a certain amount of consulting work, and then the winery sends them samples and says, "We have 25,000 gallons of this; what do we do to it to get it in the bottle without any cloudiness?" And they run a test on iron, copper, and protein cloudiness, and write back, add 50 pounds of this, and ten pounds of that, and stir, and filter through a certain pad, and bottle, and you'll have a sound wine. Yes, and they charge a reasonable price for it. And for certain kinds of wineries this, I think, is probably a good thing. For other wineries, they need their own kind of research. The problems are too unique and too specific, and they frequently need immediate answers.

Teiser: That Berkeley lab developed out of the University at Berkeley, did it not?

Amerine: Well, I'm not quite certain of that. Julius Fessler had had some experience before, but he came to the University to finish up his training. When he got through there was a demand for yeast cultures, which the University couldn't satisfy. So he set up, at his home as I recall, what was called the Berkeley Yeast Laboratory, and they supplied yeast cultures to wineries all over the world.

And then from Joslyn he acquired a knowledge of wine analysis. Many wineries didn't have the necessary equipment, and because of Duffy's public health regulations* they were likely to get libelled if the volatile acidity, acetic acid content went over a certain level. They had to know the volatile acidity, otherwise they were going to have their winery locked up. So he did a thriving business

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*See p. 15.

Amerine: during that period on doing very simple analysis for wineries just to keep them out of the clutches of the government. And alcohol contents as well.

As time went on, he got into manufacturing filter pads, and he also got into manufacturing fining agents, clarifying agents. A few years ago he sold out to Mr. [Robert] Scott, who has continued to develop the company along the same lines that he did. And Julius, I gather, has retired; he has written a little book on home wine making. He's in his 60's somewhere now, maybe even 70's, a good friend of ours. He used to come to the Society of Enologists frequently. I believe he still does some consulting.

Well, I must say that in all of my work for the wineries, not just at the University or just at the Wine Institute, I've made a lot of friends in the industry, who are now my friends irrespective of whether I am at the University or not. So I know a great many people connected directly or indirectly with the wine business.

THE SAN FRANCISCO WINE AND FOOD SOCIETY, BOHEMIAN CLUB AND SOME PHILOSOPHY

Amerine: A large part of that came about through the San Francisco Wine and Food Society, which Professor Winkler and I joined about 1937, and I have been chairman the last two years of the group, just having finished my term in June of this year.

Teiser: Mr. Rossi told me about it sadly. The morning after your last meeting I was interviewing him.

Amerine: Well, I will still be on the board next year. I will watch them, of course, but enough is enough in this sort of thing. It's probably as good a time to say it as any: my philosophy that I acquired from my early experience, is that nobody is indispensable, and other people have good ideas as well as you do. Since the College of Agriculture is on five to seven year rotation, when the five years are up, I rotate. The department I'm sure would have been happy to see me keep on. But I wouldn't have been writing books.

Amerine: I would have been killing myself doing night work over administrative details and stuff like that that has to be done; if not at night on weekends. It would have changed the character of my life and I would have been working for the job rather than working at the job. And the Wine and Food Society is the same sort of thing. You can spend all your time on it if you want. We have a young man coming on who'll be just fine. He does very good work. And the faculty thing, too. I could have kept on at the faculty thing every year and gone back on some committees. And I said, no, I've done that sort of thing, and so forth, and that's the end of that. Just Saturday I am resigning as captain of my camp at the Bohemian Club because I've had that job for five or six years, and somebody else can do that.

Teiser: Haven't you been in charge of the selection of wines for the Bohemian Club?

Amerine: Yes, I've been chairman of the wine committee for many years, and maybe this year they'll fire me or I might get out of that job too.

When you get older you try to simplify your life a little bit, not let your jobs run you. When you're younger it's fun and there is, I suppose, a small amount of glory associated with them. But I've done that Bohemian Club thing for 20 years now.

Teiser: How did you happen to start?

Amerine: Well, I got to join the Bohemian Club through two friends that I knew in the Wine and Food Society. And then of course Dean Lipman at Berkeley belonged and was a good friend of mine. Then, one of the future regents, Farnham Griffith, was a good friend of mine. He was president of the club and he put me on the wine committee. I just stuck because I probably knew more about the judging sort of aspect than they did.

TRAVELS

Amerine: I probably should say a little bit about the trips, and also about the University.... One of the things I'd like to emphasize is that the department has had very good relations campus-wide. The proof of that I think would be not only the offices that we've held--Winkler was chairman of the Budget Committee; I was chairman of the faculty, and so forth--but also Winkler was Faculty Research Lecturer, and five years later I was the Faculty Research Lecturer. So that we could feel that we were appreciated on the campus, and that we were, I think, a credit to the campus, and this is probably one of the reasons that has made the department a good department. The staff very early felt that they were needed and they worked hard. Everybody in the department worked hard, and the campus recognized it.

Well, I knew that I wasn't going to stay in the wine business unless I learned quite a bit about it rather quickly, so in 1937 I got a leave and went to Europe for three months. I was getting $2200. But I went abroad on the Normandy and came back on the Ile de France, not first class but cabin class, not tourist. And I went all around France and I saw a lot of wineries. I think I had forty letters of introduction. I used the forty letters of introduction while I was there. And I went to the exposition in Paris and saw a lot of wines, and through some connections I got to taste a lot of wines there. I had a lot of fun and I learned a great deal about wines in '37 in Paris and all around France.

In Bordeaux I had friends. Knowles Ryerson had a friend who lived there. He was just coming in as dean at that time. He came to see me before he came here and said, "See my friend there." He, in turn, introduced me to other people, who've since sent their sons here to the University, and so forth.

I got to Switzerland for a couple of days, but I did get to see some of the Swiss experiment stations. That was interesting, but I'd seen other experiment stations too. So I came back with quite a bit of appreciation of what the European industry was like at that time. Then after the war when I had been in North Africa and India, I....

Teiser: Was your war work in any way connected with the wine industry?

Amerine: No, I can't say that the war work had anything to do with it at all. The only break I got.... I was drafted as a private. However, a friend of mine put in to the Chemical Corps to select me for Chemical Corps basic training. I was sent from Monterey to Camp Sibert, Alabama, for the Chemical Corps. And then while there I applied for Officers' Candidate School and went to Officers' Candidate School at Edgewood Arsenal, Maryland. So I became a second lieutenant there in the early part of '43 and went abroad that summer and came back in the fall of '45 as an officer in a chemical laboratory company.

So I was doing chemical analysis. I probably learned a little chemistry. But I was very lucky. I was in a small company of eight officers and 60 enlisted men, all of whom I got to know very well, and which had quite a bit of esprit de corps.

Well, after the war, I came back in '46, and I had never had a sabbatical. I'd been here since '35. I had a special leave in '37, out of the generosity of Claude B. Hutchinson's and A.J. Winkler's hearts. I then wanted to do a general travel in Europe, and I wanted to see the dessert wine areas. I knew, or thought I knew, quite a bit about table wines, but I didn't know as much about dessert wines. Dessert wines still constituted the bulk of California wine production. So that year I was away for eight months. I went first to the Madeira Islands, then to Portugal, Spain, France, Italy, Greece, Germany, and Switzerland.

Teiser: Was that on a Guggenheim?

Amerine: The Guggenheim was later, in '54.

I took another sabbatical seven years later in '54 and on that sabbatical, I went first to Portugal and Spain. I studied in Spain for six months. I was then on a Guggenheim fellowship. I did go to Morocco a little while from Spain. And then I went to Italy, Austria and Switzerland. I had four months of study in Germany, and then I came to France. So my two centers of interest were the six months in Madrid and the four months in Germany. I was doing

Amerine: research during much of the time, but I did a lot of travelling too and visited wineries and vineyards. And then I should have taken a sabbatical in '61, but I didn't go until '62 because that would have meant I would come back and be department chairman again. I wasn't anxious to do that. I think the best time to make a change is when the old department chairman leaves for six months or a year. The new department chairman doesn't have anybody looking over his shoulder then.

So that I was gone then when [James A.] Cook took over after me. In '62 I went around the world. I was in western Europe for a while, and then from western Europe I went to Russia to an international wine congress. From there I went to India again, where I'd been two years during the war, and visited and lectured at the Central Food Research station at Mysore in the south. I then went on to Thailand, Hong Kong and Japan where I lectured through the month of January in '63.

Teiser: Where did you lecture there? A university?

Amerine: I was at the University of Tokyo and also at Yamanashi University at Kofū and then at several different wine and alcoholic beverage companies. There are about four big companies that control the Japanese wine industry and they have large technical staffs so they are capable of putting on tastings and listening to technical discussions.

Teiser: Is that grape wines?

Amerine: Grape wines, yes. That is, the four companies produce grape wines. Suntory for example, which you know as a whiskey company, was originally really a wine company, which later got into whiskey. And there are several others of the same kind. Well, anyway, that was very pleasant.

And then in '64 I was invited to participate in a wine symposium in Bordeaux, and again in '67 I was invited to participate in the second symposium there.

Teiser: Was this the Symposium International d'Oenologie?

Amerine: Yes. And in '67, I not only participated in the Bordeaux symposium, but I went back and lectured in

Amerine: Japan for a month. So I was gone four months that time. In '68 I went over for a vacation with some friends interested in wine and later in the year I went to South Africa on another trip to visit the South African wine industry. This was at their invitation (and expense) to see some of their problems, to lecture at the university at Stellenbosch, and to give a speech to open their annual wine show. And in '69 I've been to Chile to look at the problems of the Chilean wine industry. I didn't find it to be a very rewarding assignment, but....

Teiser: Why not?

Amerine: Well, they have a lot of problems. Their wine industry is just coming into the 20th century and it's going to be hard. I doubt if they can do it easily. But I think they have some people who can do it. At least they should be able to. So I suppose that through these conventions, trips and lectures, and the fact that we've published quite a lot, that Davis and I came to be well known in international wine circles. In addition, the Office International de la Vigne et du Vin gave Joslyn and I a prize for two of our books,* which immediately called the attention of all the wine people in the world belonging to the Office International de la Vigne et du Vin to the University of California. That didn't hurt our image. And so now it'd be pretty hard to go any place in the wine world and say "University of California" and not find someone who knows our work.

Teiser: Has all this materially increased the prestige of California wines?

Amerine: To a certain extent, yes. But the prestige of California wines depends on two other factors. The large producers are producing sound, good wines that are good every place at all times. That's something that the European countries are just getting into. At the same prices that we're putting out sound, good wines, they often produce cloudy and unstable wines, and frequently wines with a high volatile acidity (high acetic acid content). And we practically never do. We are also producing very high quality wines

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*Table Wines and Dessert, Appetizer and Related Flavored Wines.

Amerine: with some bottle aging from the finest varieties made by the most modern methods. So we have succeeded in catching both ends of the quality picture. Our books have, we hope, helped.

Teiser: Do they respect our high quality wines?

Amerine: Everybody knows this now, and they don't turn down their noses at California wines any more, at either end of the scale. If they turn it down at one end, then I say, "Well, look what the California wine industry is doing at the other end." So they don't argue with us any more. They probably never personally argued with me. I have heard and read some people that were frowning upon our wines.

There aren't very many high quality wines any place. Percentage-wise there are just as many and just as high quality wines in California as there are in the European countries.

Also, we have tried generally to get the industry away from making comparisons. We haven't succeeded too well on this, but I have written several articles for San Francisco Magazine, and they take the point of view: we make the finest California wines in the world in California. They aren't comparable to Bordeaux wines any more than Bordeaux wines are comparable to California wines. Or they aren't comparable with German wines any more than Italian wines are not comparable with German wines. Or, any more than you compare a Brahms symphony with a Beethoven symphony. You just don't do it. You listen to Brahms and you hear one thing; you listen to Beethoven and you hear another thing. To compare them would be an invidious comparison.

THE CHANGING WINE INDUSTRY

Amerine: If there's any sermon that the industry's been learning from the University, I think it's the sermon that there is a wide range of quality in wines, and that you only get out of it what you put into it. You can't make a silk purse out of a sow's ear. And that there is a market for a wide variety of products. And like General Motors doesn't produce

Amerine: just Chevrolets but produces Buicks and Cadillacs, and Ford doesn't produce just Fords but produces Mercurys and Lincolns and Mark Continentals. So the wine industry must cover an entire consumer market. And there are people who want more complex wines and there are people who want very simple wines. There are people who can only afford to pay 70 cents and there are people who can afford to pay $7. And the industry must cover all these demands.

The University has never gotten itself into supporting just one segment of the industry. In fact, if there's any criticism, the big people say, "Oh you spend too much time with the little people." And the little people say, "You spend too much time with the big people." So we've succeeded at both ends I think.

And there are, I think, people who recognize it, too. They may like to drink high quality wines, but at the same time, they're quite willing to sit down with the staff of the large wineries and say, "How can we improve this wine? What should be changed about this wine? What's wrong with the blend?" We give just as much attention or more to them as we do to Christian Brothers or Beaulieu. They want to know, "Shall we bottle this as a vintage wine or should we put it out as Christian Brothers burgundy or claret or something like that?"

LACK OF STUDENTS

Amerine: I always have to end on a note of some unsatisfaction. I would say that probably we have not succeeded in attracting the number and quality of students that we should have, and that may be because for a long time there were no positions in the industry for people. They had to work very hard for low wages, and the industry is suffering from that now. A good many people who are now in the middle management echelon started out at $200 a month in the industry. They worked during the war for $3,000-$5,000. Now the industry pays $8,000, $9,000, $10,000 to get any kind of technical help at all. But we have a hard time convincing sons and daughters of these people that there are these opportunities. So we are not producing

Amerine: enough trained people here. Maybe that's because we are not as good teachers as we are research people. It's hard to say what the reasons for it are. But it has been disappointing to us that we have not attracted as many students at the bachelor's level as the industry needs and deserves and which we are qualified to produce.

It's just that the image of the wine industry has not been a good one from Prohibition and the 1930's. Also when we get through with them here, they have to take 22 units of chemistry--on the semester plan--and you only have to have 28 to graduate in chemistry. So what did the boy do that came to us and took 22 units of chemistry in the 1950's and 1960's? He found that Shell Development would pay him $10,000 if he would take six more units of chemistry. Shell Development has a wonderful image of taking care of its employees, vacations and other side benefits, and not firing them, and so on.

Teiser: Do you get many foreign students?

Amerine: Yes, we have had a fair number of foreign students, perhaps as many or more than we need. We have people from Australia and South Africa getting their Ph.D. here. They really have no place else to go because of the language barrier. There's no place else giving Ph.D.'s in this particular field.

A number of people with the bachelor's degree come here just for a year or two. Dr. Cook took his last sabbatical in Mexico. He had three or four boys who wanted to come and just sit in on the classes when he came back, because they thought that just by osmosis they would absorb something from the department. Anyway, if they could get in, we'd have a lot more, but several of them we've been sending down to Fresno [State College] where a practical program has been developing. Since they can't matriculate at the University, rather than have them here as a special student, which is always a sort of dead weight and you don't get any real credit for them, we've been sending them down there. Two very nice boys from South Africa went down there. I was sorry they couldn't get in here, but they just didn't have the grades.

THE INTERRELATION OF THE UNIVERSITY AND THE WINE INDUSTRY

Amerine: Anyway, I think we're going to have a wine industry for quite a while in California. There was some time when I wasn't quite sure. And I think the University is going to be part of it for quite a while too. We can't escape the industry, and the industry can't entirely escape us. We've become sort of mutually dependent on each other. At the same time, we've had a pretty good relation within the University itself as a department, and as a relatively new department. Especially since wine wasn't considered a very nice beverage at one time.

Teiser: Yes. There's so much glamour attached to the industry now--I think partly from your writing--that I'm surprised that there isn't a kind of student coming into the department who is attracted simply by the glamour.

Amerine: Well, I'm a sort of soft-sell person; that's probably partially my fault too as well as the students' fault. For example in Vit. 3, where we've had this year 260, I do give part of a lecture on opportunities in the grape and wine industry, but it's always very soft-sell, with lots of if's, and's, and but's.

I think it's a big responsibility to train a man for a limited field. In case he doesn't like it, he doesn't have many other places to go. That's why the enology major is a part of Food Science. I got that changed some years ago, so that they really do have some choice. If they take our courses, they will also take several Food Science courses, so that if in the senior year they say, "Well, I don't like the wine industry," or they don't find a job in the wine industry, they can go to the canning industry if they want. Or they can go to the frozen food industry, the brewing industry, the baking industry, et cetera.

This has made me feel better about a harder sell in the last two or three years. Before that I was always very careful. I felt that if the industry really wanted people that bad, they should put money in it. They did put some money in scholarships. They did get some people to come here on scholarships.

Amerine: In fact, we still have a scholarship program. And this is what they had to do. We told them, if they didn't put money in the field, they couldn't expect people to go into the industry. A few wineries have a less desirable image which they built up for themselves on employment practices. For example, there are some people in the California wine industry who have worked in eight or ten wineries. This couldn't have been altogether the person's fault although, in some cases, I suspect it was just as much his fault as the industry's. I suspect it was in some cases also the industry's fault. That isn't true any more. The industry doesn't like to see anybody leave if they can help it.

THE SAN JOAQUIN AS A QUALITY WINE DISTRICT

Teiser: There are some controversial opinions that I keep getting that I'd like your opinions of. Some I have in mind now, and perhaps I'll gather up more of them. One of them is that you can raise grapes of a better quality to make wine of a better quality in the hot valleys than it used to be thought you could.

Amerine: Well, that's sort of wishful thinking. I think we can recommend, we are recommending varieties of grapes for planting in the interior valley. We are doing a lot of research on varieties in Region IV and did a lot in the past. As table wine consumption has gone up, the industry had to go some place to get the grapes. There are only limited vacant areas for grapes in the coast counties. At present the industry is counting on some of the new recommended varieties, such as the French Colombard and the Ruby Cabernet, which they never had any of before. They can improve the quality of grapes for wine making in the San Joaquin Valley. I think they are.

The Ruby Cabernet is making some good wines when it's properly handled, and the French Colombard is also. I even think Chenin blanc might be a suitable variety for those conditions. Olmo has also developed some new varieties. At the same time they are working hard on sprinkling and vine training systems to cut down the temperature. This is an admission that it is hot in the valley. And it's going to stay hot.

Amerine: But if by sprinkling or training you reduce the daily temperature ten degrees, the heat summation will place some areas in Region IV in Region III conditions. And I'd be the first to say that then they would be in Region III conditions. No, neither Winkler nor I have ever said that the law of the Medes and Persians lay in the Region I to V concept. We just say that it's the best picture we have at the present time of the most important factor influencing the composition and the quality of California grapes.

The number of hours of sunshine, number of hours of fog, relative night to day temperatures are also factors. I think we'll turn out to have no less than ten and possibly even 15 climate zones in California. These will produce different colored wines and different flavored wines. And this is all to the good. I welcome this development. No, they're growing wine grapes in the San Joaquin Valley right now because they have to. It's the only place there is. There are houses on much of the land in the Santa Clara Valley, and the Napa Valley. And land is too expensive.

Teiser: Most people seem to take a defeatist attitude about the hill land in, say, the Mother Lode, about it's being too hard to cultivate. But might it not be possible that some day the technologists will develop ways to....

Amerine: Well, the Mother Lode fails just because in a year like this one you get snow at fairly low elevations and consequently you get spring frosts, because the wind comes off the snowpacks and comes down past Placerville and Auburn and into Folsom and that area. Folsom did have a wine industry in the 1870's and '90's, and a fairly good-sized planting. Getting frost every five years or every ten years gradually caused them to lose money and they went out of business.

Teiser: Suppose the industry allows for that?

Amerine: This may be. We obviously are going to use hillside land in California as land becomes more expensive. I would suspect they will find smaller valleys hither and yon. And of course the west side of the San Joaquin does offer a better opportunity, and it does

Amerine: get shady in the afternoon. Whereas the east side stays sunny in the afternoon. So the west side might actually turn out to be a little cooler.

The University has an experiment station at Five Points, on the west side, which is studying these very points. We have a grape variety collection there now. Well, if you don't have anything else, you plant what you can and then you justify it philosophically the best you can. I wouldn't expect them to take any other attitude than that. There probably is some Delta land that's fairly cool--it may even be Region III--that could go into grapes. They would get good production and it would be cooler.

PHYLLOXERA-RESISTANT STOCKS OR NOT?

Teiser: Let me ask you about another more or less controversial subject. Do you have any opinion on not planting on phylloxera-free resistant stock?

Amerine: Well, we don't recommend the practice. It's a risk. No matter where you do it, it's always a risk. The Almaden vineyard at Paicines is planted on their own roots. Neither [Lloyd A.] Lider nor I nor Winkler nor anybody at any time ever gave them any go-ahead signal on that. So far it seems to have worked. It's an isolated area. By controlling the movement of equipment, it might be some time before phylloxera got there.

In the meantime, they would have made a million dollars or more in savings. Just think of the interest on a million dollars nowadays! And in addition, phylloxera does not seem to spread very fast in some areas. It's only in a few areas that phylloxera has spread very rapidly. In fact, there's some feeling that phylloxera all over the world is not quite as virulent as it was 50 or 100 years ago, for reasons that I don't understand. And I don't think that anybody understands. So I myself would not.

I would never recommend it, and I know the University does not recommend it. We simply say, "This is your alternative, and you have to figure out your own odds and your own interest. If you want

Amerine: to take the risk, the chances are thus and so that it will work."

However, even in the San Joaquin Valley now they're putting grapes on resistant stock as nematode infestation gets worse. At least one new vineyard near Livingston is on nematode-resistant stock. They feel that this is necessary and will prove worthwhile. The vines are just not lasting if they don't put them on resistant stock. The nematodes may be more injurious than phylloxera.

There are few, if any, vineyards in the Napa Valley that aren't on resistant stocks. The own-rooted vines are mainly in isolated areas. And if it works, it works. If it doesn't, they probably will have made enough money to pay them for the experiment. And it won't all go out at one time. We know that. We can advise them that it won't be like France in 1870 where phylloxera spread forty miles in one year. This will not occur. It has not occurred. It went, I think, three miles in Sonoma in the 1870's. That's about as big a jump as we know, continuous jump, in a year. The rest of them have been very small.

FLAVORED WINES

Teiser: Do you have any opinions, esthetic or otherwise, on the flavored wines that Gallo and others have been developing?

Amerine: Well, yes. Joslyn and I had already recommended that this field be explored back in 1941 or '42. We had thought about it being more possible as variations on the vermouth formula. And as a matter of fact it was rather interesting how they developed. When the special natural flavored wines came in, they came in under the same provision of the law as vermouth. The section of the law that permits special natural flavored wine is essentially the same as the vermouth section. But they came in as citrus-flavored wine rather than as herb-flavored. I don't know whether that was because nobody had tested the herb-flavored types or whether it was because the citrus-flavored wines had greater potential. They

Amerine: may have reasoned that since they were clear-colored--all the early successful ones were very light in color--that they were simply riding on the image of people who couldn't afford vodka and gin, and therefore bought the flavored wines such as Thunderbird and Silver Satin.

I don't know the answer to it. I think the flavored wines saved much of the Thompson Seedless industry in the San Joaquin Valley. Without the demand created by the flavored wines they wouldn't have been able to crush so many Thompsons. They are selling 16 million gallons a year.

Teiser: Oh, this gets into the balance with the raisin picture, doesn't it?

Amerine: That's right. And our dessert wine consumption is going down, for port, sherry, muscatel, angelica, et cetera. Suppose it had only gone down eight million gallons--that would have been a disastrous thing from the industry's point of view to lose that much production. Thompsons just wouldn't have been worth growing. The price of Thompsons would have been $20 a ton and we would have seen thousands of acres go out.

So you have to give credit to the people who developed this, primarily Gallo. They found a market for a particular kind of wine. It seems to have reached its plateau. It's been 15-16 million gallons for four years now. So it's not increasing any more, but maybe that's just where it will be, maybe it will just stay there. Recently a number of low alcohol (12%) flavored wines have been produced and seem to have captured new customers.

Teiser: Do you think it will lead people into drinking other types of wine?

Amerine: We don't know the answer to that. Perhaps they (the industry) know the answer. I don't see any difference between drinking a citrus-flavored wine and drinking vermouth. It doesn't make any difference to my conscience at all. As long as it's made out of grapes, and citrus flavors are not toxic as far as we know. I wouldn't be surprised to see this field further developing with colors and things like that, like the sangria type of thing. There are few pink citrus

Amerine: flavored wines on the market at the present time. I thought there would have been by this time. There is a cranberry flavored wine on the market. This is the general tendency of industry with a new product: they expand it into various subproducts and so forth. Eventually it influences their whole line. And there may be other kinds of new wines. If I were in the industry, I would be spending a lot of my time on new product development. No, I don't drink them myself, but that doesn't mean...I don't drink brandy very much either.

NEW TYPES OF WINE

Teiser: Are there any other new types of wines that you think might have a place in the industry?

Amerine: Well, there are some legal questions about the low alcohol wines, and particularly the low alcohol carbonated wines, that haven't been solved.

Teiser: And if they are solved?

Amerine: If they're solved, they would represent quite a large consumption. I think there are a large number of people who might drink a slightly sweet, 5 per cent sugar, carbonated muscatel type of wine. In fact, we've done the consumer research. We tested this at the State Fair years ago. But there's no legal way we can produce and sell them at the present time. There's a minimum of 10 per cent alcohol in wines.

Oh, I'm sure there must be a lot of people interested in new beverages. The last ones tried were the wine cocktails, but the whiskey people protested, "You're not paying $10.50 a gallon tax; why should we let you put out a wine cocktail and compete with us?" So that's been withdrawn. They had suggestive names, wine martini, wine manhattan, and so forth, but the government threatened to crack down, so they were withdrawn. And you can see why.

HEROES IN THE WINE INDUSTRY

Teiser: The heroes of the industry, if you can call them that, seem to be Louis Martini the elder and Ernest Gallo. I'm interested that there are those extremes. The same people speak highly of both.

Amerine: Well, they've had, of course, quite different careers. And they've lasted. A hero, they sometimes say, is the one who lasts. Louis, of course, has created a number of fine wines, and Ernest has succeeded in nation-wide distribution with (generally) higher quality wines than his competitors in the same price range. He's not only a good salesman, but he knows exactly what he can sell and has built a staff to help him do this. I think they're both leaders in the industry. Their competitors, by and large, have had the same kind of opportunities and haven't utilized them. They had the same grapes; no different than anybody else's grapes. The same technical advice was available to all of them. The University was here all the time. Few of their competitors have approached their success.

Louis Petri's gone, and he never really succeeded with Allied the way that Ernest and Julio succeeded with Gallo. Beaulieu has been sold. For many years before, no family member was closely associated with its wine making. Inglenook was also sold some years ago. John Daniel*, a dedicated man, was associated with Inglenook. We have Charles Krug, but they've only been in business since the war.

Teiser: And few know Horace Lanza except people in the industry. I guess he's been in it as long as any one.

Amerine: Oh yes, he's quite an old man now too.

Teiser: He has no label.

Amerine: He has no label, and he was interested in parlaying. He had several wineries and he parlayed those into another winery, and at one time he had Italian Vineyard Company, but he sold that, made a profit and retired. In many respects he was a lawyer and financier who liked grapes. That's what you could say about Horace. He was a good friend of the University's research--as long as it didn't contradict his own ideas!

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*Known throughout his life as John Daniel, Jr.

Prior to the second interview session, a list of suggested subjects for discussion was sent to Professor Amerine. To it he added several more, and he referred to this list during the interview. There are several references to it in his remarks.

Ruth Teiser

(Interview #2 - San Francisco, January 30, 1971)

CALIFORNIA BRANDY

Amerine: The California wine brandy industry has a very old history. General [Henry M.] Naglee of Civil War fame settled at San Jose and made a brandy which was praised in a little publication of the Mechanics Institute back in the 1870's. Dean [Eugene W.] Hilgard at Berkeley was apparently familiar with Naglee's brandy. The State Board of Viticultural Commissioners also got into the brandy picture and published several publications on brandy production. Charles Wetmore even had a picture of the Folle blanche grape, and took a good deal of interest in brandy.

Before Prohibition, most of the small wineries made some brandy. It was their only method of recovering the alcohol from the pomace or from the wash in making of white wines. After Repeal, the brandy industry started very slowly. The Oscar Krenz Copper works, which was then in San Francisco, became the chief manufacturer of stills. But instead of using pot stills the industry almost completely went to continuous or column or plate stills. And the government made a regulation that for beverage brandy the product would have to be distilled at not over 170 proof; that is, 85 per cent alcohol. Whereas for fortifying spirits to make ports or sherries, they could distill at any proof they desired. And most of them choose to distill at 192, or 96 per cent alcohol.

At one time (about 1934), when the California wine industry was producing about 80 per cent dessert wine and only 20 per cent table wine, more than 50

Amerine: per cent of the grapes which were crushed in California ended up in wine that went through a still. So this was a major part of the California industry. Now, of course, this has gradually changed. There is less and less dessert wine being made, and under the new regulation that just went into effect this January, the alcohol content of dessert wines will be less by one or two or even three per cent.

The brandy industry as a beverage brandy, however, is continuing at a slow increase and has some very interesting patterns of brandy consumption. California is not a big consumer of brandy as it turns out. The major consumption of California brandy is in the Middle West, and particularly in Wisconsin which has by far the highest consumption of brandy of any state, and has had for many years. Just what connection there is between the German population or between the beer drinking population and California brandy, nobody seems to know.

Teiser: Do we make a German type brandy?

Amerine: Yes. I would say that California brandy is perhaps closer to Ausbach or any of the well known German brandies than it is to French brandies, because German brandies are rather neutral and California brandies tend to be neutral. But California brandies are unique, or at least distinctive, because they are aged in new American oak cooperage, and this gives them all a slight vanilla smell which European oak cooperage does not give to the brandy. And so you can almost always tell a California brandy from a European brandy from the wood smell or vanilla-like smell that you get--or the vanillin smell, to be specific, that you get from California brandy.

The industry itself feels that California brandies make a good highball, and the major part of the brandy that is produced in California does end up as highball consumption. There are some people who drink straight brandy and there are a few brandies that are specifically made to be drunk straight. I suppose the Christian Brothers brandy would be an example. It's a little softer and perhaps a tiny bit sweeter than some of the other brandies. But by and large the California brandies are intended for highball consumption.

Teiser: Isn't there now just forming a Brandy Advisory Board?

Amerine: Well, I heard something about it, but I really don't know very much about that subject. This leads us naturally then to A.R. Morrow, because the California Wine Association very shortly after Repeal named their best brandy the A.R. Morrow brandy. Mr. Morrow at that time was the chief operations manager, I guess you would say, for the California Wine Association. He had been in the industry before Prohibition and was a very distinguished looking gentleman.

He became a member of the San Francisco Wine and Food Society, where I first got to know him well. He produced some of the old California Wine Association wines from his cellar for one of the Society dinners at the Stock Exchange Club about 1938. He lived at the Brocklebank apartments on Nob Hill, just across from the Fairmont, and kept his wines in a vault in the cellar of the apartment house. He was a very quiet man. Hardly ever--well, I never heard him raise his voice at all.

As a wine taster, he was supposed to be the successor to [Henry] Lachman of the California Wine Association, who is reputed to be the best taster that the California wine industry produced. I never actually saw Morrow in operation as a taster, although he came to Davis and did taste some of our wines; but, of course, we already knew something about the wines that were in the cellar so that wasn't terribly revealing as to what his abilities one way or other were. He liked to have the chemical analysis of the wine when he was doing critical tasting for the California Wine Association. Undoubtedly he had been helped in a lot of his early tasting by Lachman and Charles Ash, who had been the chief chemist for the California Wine Association before he went to California Packing Corporation.

The Morrow brandy was a bottled-in-bond brandy at first. That means that it was aged at 100 proof or more, and there is still some A.R. Morrow being produced at a 100 proof. I guess it's the only bottled-in-bond California brandy on the market at the present time. I believe they have also produced a non-bottled-in-bond, that is, less than 100 proof brandy, in recent years.

Amerine: Morrow was at all the early meetings of the California wine industry, but I just can't remember that he ever got up and made a leading speech or directed the discussion in one direction or the other. He seemed to do his best work perhaps behind the scenes, I would guess. That is purely a guess. But a very charming man, very nice man and very easy to talk to. He was quite an elderly man after Repeal. I just don't know how old he was, but I would say he must have been in his seventies very shortly after Repeal. And he died at about eighty or eighty-two or something like that.*

I suppose his influence on the wine industry of the '30's wasn't as great as some of the younger men who had a career ahead of them and who knew they had a career ahead of them and who were more forceful in directing the industry, whereas Morrow's career was really at an end after Prohibition.

Teiser: Before you get completely away from brandy, may I ask: are there quality factors that would inhibit California's potential in brandy?

Amerine: Well, since 1939 we had Professor James Guymon as a brandy expert, a chemical engineer, on our staff. And I think he feels rather strongly that as long as we use the continuous still that the distillation process controls the quality more than almost anything else. However, if we went over to a pot still industry (and there are a few pot stills in the industry at the present time) then it might be that the grape variety would have a more marked effect.

It's the proof of distillation and the way you distill it, the arrangements within the column, and so forth, and the aging process that are chiefly responsible for the quality of the brandy. And presumably you can make pretty good California brandy as we now know it from almost any wine. Either white or sometimes even red wines are used, but generally white. We're not making anything like a French Cognac type, where the wine itself has some influence and where the pot stills are essential to the process. The reasons why column stills are used are, I think, very clear. The pot still operation is perhaps twice

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*A.R. Morrow died August 20, 1951.

Amerine: as expensive and would immediately increase the price of the California brandies. And that wood factor that I mentioned already superimposes a character on all the California brandies which might not be suitable for the French type of brandy. So even if we did use pot stills, we would then have to get hard oak cooperage so that we wouldn't have the vanilla character superimposed upon the pot still character.

So I would think that perhaps the California brandy industry will continue pretty much as it is at the present time. Maybe some more older brandies will appear on the market as time goes on. There are fair stocks of brandy available now, although with the price of grapes going up that tends to cut down on the amount of distillation. People tend to make more wine than they do brandy under those circumstances and interest rates have, of course, cut down on the amount of brandy that's being laid down.

There are some possibilities of producing colorless brandy. These are occasionally talked about. Nobody has had the courage to try one of them yet. This would get them into the gin-rum-vodka field where the competition is fierce and the raw material cheaper than grapes. There is a general tendency for distilled alcoholic beverages to have less color these days. So that somebody, if we ever had a surplus of grapes again, or somebody who had a large marketing organization might actually try to get into the almost white brandy industry. This is already a factor in South Africa.

Teiser: How would that be made then? How would it be aged?

Amerine: Well, we just wouldn't age it--we'd age it in paraffin barrels. That is the way they usually do it so that they don't pick any color from the wood. As a matter of fact, however, most of the color in California brandy comes from caramel syrup rather than from the wood itself. It doesn't pick up color very fast and they adjust color with the caramel syrup some time before it's sold.

All right, so much for brandy and for Mr. Morrow's connection with it. I suppose I should say that perhaps he did control the quality of that Morrow brandy since it had his name on it. I don't really remember very much about the Morrow brandy in 1936-'37.

Amerine: It seems to me it was a rather heavy brandy. Possibly distilled at lower proof and possibly some muscat wine was used in it. I'm not sure of that. I do recall that he's supposed to have gone down the valley to Delano and perhaps to Guasti to watch the distillation, but whether he actually directed the operation, I don't know.

MORE ON WINE JUDGINGS

Amerine: One of the features of the post-Prohibition period has been the wine judgings. They started at the State Fair in 1935. There had been some wine judgings in the pre-Prohibition period, intermittently. Haraszthy got a prize at the State Fair some time in the 1850's, and there were reports in the State Agricultural Society's reports of judgings held at various times. But nobody ever spoke of a medal obtained before Prohibition or anything like that. If they wanted recognition, they sent them to St. Louis in 1904, or they sent them to the Paris Exposition of 1900, and various other places. The United States Department of Agriculture actually analyzed all the wines that were sent to the Paris Exposition in 1900 and published the results in a Bureau of Chemistry bulletin.

It was not until after Prohibition that an interest in judgings developed. This was enthusiastically supported by the industry. As I said, the State Fair judging of 1935 was the first one, and Bioletti judged at that one and I can't remember who the other two judges were. There were three judges at that time. And I don't remember who judged in 1936. But starting in 1937 the University, in effect, was in charge of the judgings and that lasted right up 'til the war. Professor Cruess was chairman, I think, in 1937 and I was chairman in '38 and until the war and some years after the war also.

We tried to break the University's influence on the judging but there simply weren't enough disinterested good tasters available for the week it took for the judgings, just before the vintage season in Sacramento. What we did just before the war was try and get one elder statesman from the industry

Amerine: and one young person from the industry plus one University man to be judges, and we split the judging into four groups. So that, although there were four University people participating, there was just one on each committee and there were two people from the industry. And we hoped to train the young industry people to become eventually the chairman of one of these committees. And it turned out that was a good idea, because some of those people have become our best tasters at the present time.

The facilities were gradually improved. This was a long hard battle with the State Fair people. At the beginning in 1937, we had a little room in the county building that was crowded, noisy and dusty. The wines were all chilled in the room and they were put in paper bags, I remember, or they had numbers on them. But getting the glasses in and out, and the spittoons in and out was a big problem. This was improved a year or two later at my instigation by moving us across the way where we had a lounge for the judges to sit and where we had several rooms, two rooms, where they could taste, and there was a large preparatory room where the wines could be prepared.

And we gradually built up a staff of people who knew how to do all of these things: coding, de-coding, taking the labels off, and pouring the wines properly, and washing the glasses properly. All these things had to be worked out because we had no experience on this before, and nobody had any experience on it before.

I don't think there was any criticism of the State Fair judging during this period. In fact, there was only praise for it and everybody wanted to get prizes. Almost everybody participated in the industry, and I certainly learned a lot about California wines from the judgings.

In 1938 at the time of the International Exposition a judging was arranged for Treasure Island. I was chairman of that judging and there were five people on it. Mr. Twight was one, Dr. Charles P. Mattei* was one, Mr. George Marsh from

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*A physician; not a member of the San Joaquin Valley Mattei family that was in the wine industry.

Amerine: the University of California, Berkeley, and Harold Price, an attorney in San Francisco and general secretary of the Wine and Food Society. This group met every week end for six or eight week ends during the summer of 1938, meeting both on Saturday and on Sunday. This allowed Professor Marsh and me not to have to take time out from the University, and for the doctors and lawyers and other people not to have to take time away from their business affairs. And also we didn't get tired that way.

We judged a limited number of wines. There were about 350 wines at that Exposition, and we gave two grand prix, one to a Beaulieu burgundy and the other to the Sauvignon blanc of Wente Bros. And there were a number of gold medals and quite a number of silver medals also given. The two grand prix actually meant something. That had a really lasting influence. Mr. [Georges] de Latour always spoke with pride in having gotten the grand prix, and Herman Wente always spoke with pride that that was the first big recognition that his Sauvignon blanc had had. As I say, the results were very well received by the industry.

There was at least one judging at the Los Angeles county fair before the war. I went down with George Marsh to participate in that. There was a certain amount of rivalry between the Los Angeles county fair and the State Fair. As a matter of fact, the Los Angeles county fair was larger than the State Fair in attendance at that time, and it also lasted longer. The general method of choosing wines was for the counties to have them in their exhibits and then one or two bottles would be selected from them for the judging. So that since they took their State Fair exhibits down to the Los Angeles county fair, the same wines were judged at both locations.

I don't think that there was any great harm done by this, but the results of both fairs were weakened by the fact that the judges didn't always get the same results at both fairs. By and large they did a pretty good job. The group down there was quite different than the group at Sacramento, except, as I say, Marsh and I went once or twice. But the results came out fairly similarly.

There was also an effort at this time to internationalize the State Fair. Ned Green was in charge

Amerine: of the county building at that time and eventually became the director of the State Fair. And we did hold, I guess, one or two international fairs. A New York state wine got a prize and a Seppelt, an Australian champagne, got a prize.

We brought men from Canada, Maryland, and New York to California to help in the judging. Mr. [A.] de Chaunac from Canada, Mr. Charles Fournier from New York, and Mr. Philip Wagner from Maryland. They didn't all come one year, but one or two of them came the two or three years that the international judging lasted. This was eventually killed by the State Fair advisory board. They pointed out that it was a California state fair and thought that giving prizes to wines that were not from California sort of down-graded the results of the prizes that were given to the California people, and so the state board eventually cut off the international aspect, and these people no longer came to California to judge.

After the war the judging was reinstituted and in order to get qualified judges, we set up a trial judging for prospective judges in which we had them do various kinds of judging and then we picked out the best people for this.

One of the things was to recognize. We give them three white wines and ask them which varieties of grapes they were made from. We would have a Chardonnay, a Sauvignon blanc, and perhaps a Traminer or something else would be the three varieties. And if they got them all three wrong, well, we weren't very much interested in them. We also did that with Cabernets, Zinfandels, and Pinot noirs. We also had judgings with different amounts of acid in which they would be required to rank them in different amounts of acid or attempt to place them in order of their sulfur dioxide content. Or we would dilute muscats with non-muscat flavored wine and then ask them to put them in order of their muscat content.

All of this was related somewhat to the ability of the people to identify characteristics of wines that are important in wine judging. And we did get a group of about 20 people who did very well on these, out of perhaps 50 or 60 who participated. And also taught a lot of people how little they knew about wine, I might say, including some of the University

Amerine: people. But everybody improved, I think, after they learned the judging. They watched for things that perhaps they hadn't watched for before.

I gradually shifted the responsibility on Mr. George Cooke, who had become our extension man, and then finally dropped out entirely from the judging. One of the reasons that I had dropped out was that I felt the University was too closely associated with the State Fair judging, and since we had to work with everybody in the industry it was not desirable to become too closely associated with the judging. Especially after a number of the wineries dropped out of the State Fair judging. Almaden dropped out for some inadvertent remark by one of the directors of the State Fair, which he apologized for, but the damage was done for all time. Inglenook and Beaulieu dropped out because they had all the medals they could take care of, and they didn't need to risk their reputation any more.

So for a variety of reasons, I felt that since a lot of people in the industry were not participating, and notably Gallo, which never participated at all in the whole history of the State Fair, that it was better for the University not to be associated with it. Some of my colleagues didn't feel that way, and they continued to judge. But, in general, I think they philosophically at least agreed with me.

The State Fair judging has been dropped now for at least three or four years, and I understand the Los Angeles county fair is about to discontinue the wine judging. I don't know what the future of wine judging might be in California. The industry doesn't really need a wine judging right now. They're selling some fine wines on allocation for 1972 and 1973, and you don't need a wine judging when you've got everything sold ahead of time, at very much higher prices than we've ever sold wines before in the history of California.

So a wine judging doesn't really do anything for the wine industry now. They've got the reputation. They've got it already made. They've got the wine sold, and so why should they go to the time and trouble to go to the State Fair to get another gold medal?

Teiser: Does it have any effect upon quality standards objectively, however?

Amerine: Well, I think when the industry didn't have a reputation, and when you could buy a Cabernet at a dollar a bottle, the State Fair judgings helped to call attention to the fact that California did produce quality wines. And that if you got a gold medal for your Cabernet several years running, you probably made a better Cabernet than somebody else.

Teiser: It would make you try harder to make a good Cabernet?

Amerine: Yes, I think the industry people watched the results very carefully, and they knew that the people who got the prizes were the people who were making the best wines, and they came to recognize that very quickly. I think the judgings before the war particularly had a salutary effect. I think the method of doing the judging, which became much more complicated after the war, also impressed the industry.

We had a very complicated system, a triple system, of judging, which I don't need to go into here, which I developed specifically for the State Fair. It led to much better results, and not nearly as many discussions between the judges and so forth, as the older types of judging did. But they were useful, I think, in their time and place, but as far as the future is concerned, I don't think that there is going to be any regular judging.

There might be one at an occasional fair. If there was a fair in Los Angeles, like a world's fair, something like that, in a few years, then a judging there might have some place. And there may be some place for local judgings. As a matter of fact, there already are some non-official judgings that the industry itself goes through each year between wineries, and the results being kept just between the wineries, to sort of evaluate what the quality of each vintage is, and which lots are better than other lots and so forth.

The industry has many more people who are capable of judging now than we had at that time. As I indicated earlier, there simply weren't people in the industry who could go to Sacramento and to

Amerine: the judging. That's why the University became so closely associated with the judging. And, furthermore, the University had no axe to grind. They were not, you know, in favor of anything except quality wines, and that was well recognized, and the people trusted the University.*

STATE AND FEDERAL STANDARDS

Amerine: The State Board of Public Health after the repeal of Prohibition, and particularly the Bureau of Food and Drug Inspection, I guess, which was Milton T. Duffy's bailiwick, set up standards for wines. The industry and the University both participated in the hearings on these standards, and in general they followed the federal standards, with some notable changes. One of the changes was to keep the alcohol content. Nineteen and one-half was the minimum alcohol content for dessert wines. That's just been changed as of January first, and it was probably in the state for too long a time.

There were two reasons for the high per cent of alcohol in California dessert wines. One was that they wanted to sell as many grapes as they could, and so the higher the alcohol content was, the more grapes that had to be crushed to make the brandy to add to it, so the more grapes they were using. That was one reason for that alcohol.

The other one was that the industry was afraid that if they lowered the alcohol with water below the 19-1/2, there would be a lot of diluting going on in transit and so forth, and that the California wines would then spoil at the place where they were being distributed. And this was, I think, a very real fear because there was a lot of bulk wine being shipped from California at that time. And if we hadn't had that 19-1/2 per cent minimum, it would have been diluted enroute to its eventual destination, particularly outside of California.

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*See also pp. 63-71.

Amerine: Duffy also, with the industry's and University's help, raised the standards for volatile acidity. This is a measure of spoilage of wines and essentially measures the acetic acid content, and that was a very good thing public relation-wise, because the California standards were stricter than the federal standards, and considerably more strict than the French or Spanish or German standards. So that people could and did--and the Wine Institute in particular--said that California had the highest standards for wines of any country in the world. And I think to a certain extent that was true.

Duffy had some teeth in his standards too. In the early days he made spot inspections of wineries, and if the wines did not conform to the standards, particularly the volatile acidity standard, he could impound the wine. Or what they call technically, he could libel the wine, he could hold the wine in the winery until it had been pasteurized and blended, or had been distilled or otherwise disposed of. Some of the industry people didn't take kindly to this and the funds for this inspection were gradually removed from the public health budget.

But the good effects of Duffy's standards had already been accomplished because everybody realized that they were quite fair, and I would say by the time of the war there were no California wines being produced or distributed that didn't conform to Duffy's standards. In fact, I published two large papers on the composition of California wines from the State Fair.* It was very rare that we found a wine that even approached the legal limit for volatile acidity and so forth.

Occasionally an old dessert wine would be below the per cent alcohol, but that made it all the better from my point of view. I was never in favor of very high alcohol standards, although I understood the reasons why they were there. As a matter of fact, Duffy's standards, except for alcohol, are still in effect intact today.

Gradually in the 1950's and particularly in the beginning of 1960, Duffy's department began to take

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*Appendix I, #45 and #161.

Amerine: another look at the California wine industry because of the federal Food and Drug Administration's attitude toward food producing plants. Prior to about 1950 the Food and Drug Administration did not take a very hard look at the conditions in which foods were processed. They had standards for inspecting meat and they had standards for wines, just like California did, but that was after they were produced. But the conditions under which the food was grown and produced was not a primary interest.

The Miller amendment to the Food and Drug Act, which said that it cannot be sold as a food if it's been produced under conditions where it might have become contaminated, changed the whole attitude of both the federal and state government. The question of fruit flies in the winery then became of considerable concern because if there were fruit flies in the winery, they could get in the wine. And there were actually some California wines that were seized in the eastern United States for containing fruit fly wings and so forth. I don't think this hurt the wine at all, but the government's contention was that since the fruit flies were there, other things might have gotten into the wine, and they had been subjected to conditions where they might have become contaminated.

So that Mr. Duffy then began to inspect grapes as they came into the winery, and the federal Food and Drug Administration in San Francisco took an entirely new look at the whole question of sanitation in the grape industry and the wine industry.

The industry responded to this by setting up voluntary grape inspection. They were given a leeway, and every load of grapes was and still is inspected when it's delivered to California wineries, particularly in the San Joaquin Valley. Not so in the other parts of the state, although they have done some inspection. They were given an allowance of ten per cent; if they found mold on ten per cent or more of the clusters or if there were excessive fruit flies and so forth in the clusters themselves, the load became useful only for producing distilling material. This had some very salutary effects. First of all, people began to pick grapes earlier, which we at the University felt was a very good thing. Also, in case of any rain or early high humidity conditions, the industry would rush up the

Amerine: harvest season, so there would be less rot in the grapes and so forth.

And, generally speaking, I think that the Food and Drug Administration and Duffy's department had a beneficial effect on the industry, calling attention to the fact that the grapes had to be produced under good conditions and delivered under good conditions. The long line-ups of trucks waiting to be unloaded at wineries disappeared during this period. People were forced to go on schedules--that is, you were to deliver at eight o'clock in the morning or you were to deliver at three o'clock in the afternoon. All kinds of methods were used so that grapes were not held any longer than they had to be held, preferably a few hours from the time they were picked and until they were crushed. And I think the growers tended to grow grapes so they would conform to the standards better. So I would say, altogether, this was a good thing and the industry learned to live with it.

They appointed a sanitarian, Mr. [A.D.] Davidson, who was a former--I think he may have been in the Food and Drug Administration, I'm not sure of that--but he became the industry's sanitarian. He published a sanitation book as a guide for wineries.* This had many good results. The bottling rooms were changed. The bottling rooms now generally operate under positive pressure so no insects or flies can get in the bottling room.

He held meetings with the industry, developed industry groups who were interested in sanitation in wineries, and it's quite a difference. You can go in a winery today which looks more like a dairy than the wineries of twenty or thirty years ago, some of which were pretty messy.

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*Wine Institute Sanitation Guide for Wineries.

SPOKESMAN TO THE PUBLIC

Amerine: Okay, now, you've asked the question of my ex cathedra perhaps on behalf of the wine industry.* That isn't quite correct. We did have a number of people in San Francisco starting in the early 'fifties who asked us to give talks at the Rotary clubs, and private groups and so forth. I, of course, was somewhat known through my long-time membership in the Wine and Food Society for comments on wines there.

So my friend Professor [Edward B.] Roessler, who was in charge of the Davis extension department at that time, organized or provided a format for doing this, and that continued down until just three years ago. And between one and two thousand people, I guess, altogether, participated in these courses. They were given alternately on the eastern side of the bay and the west side of the bay. They were given in San Mateo once or twice, and they were given in Sacramento or Davis on alternate years. Altogether I suppose about 15 years.

The format changed somewhat on the extension courses. The early courses had about thirty. It finally went up to around one hundred. This proved unmanageable and we finally began to cut it off at 50. And that was one reason for discontinuing the courses. The first reason for discontinuing the courses was that I got tired of doing it, since there was very little money involved. And second, I got tired of being called in the middle of the night: please let John Doe into the course, because he was above the 50 limit.

We also gave some of these in the Napa Valley, several years of these. These have continued in Napa Valley in slightly different format with the people in Napa Valley doing the instruction, which I think is a fine thing.

The idea was a good one. It introduced a large number of people to wine as an aesthetic beverage, and

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*In a December 16, 1970, memorandum, suggested subjects for discussion included Professor Amerine's role as "the wine industry's spokesman to the public."

Amerine: it also gave them some basis for comparing wines. And it gave them fair background on how wines are produced and what the differences between wines were. As I say, they were immensely popular and I suppose we could have had 500 in each one if we had opened them up. As a matter of fact, in the latter years we gave very little public relations to it. Practically no newspaper announcements or anything, because the course was all filled up before we even determined the time we were going to have it.

I think the University Extension deserves a good deal of credit for this because they cooperated one hundred per cent. We never had any difficulties in the arrangement of anything. In the last year it was given, which was three years ago, the director of University Extension at Davis asked if I would put it on tape so that it could be used on television. And we did do that and it was used in Sacramento once, and it's been used in San Francisco a couple of times. And I believe some place else, I'm not sure where, and I think this was all right.

Unfortunately, the station where it was taped was not very familiar with the material and I was under great pressure of other activities at the time so the direction was not terribly good, and I don't think it really showed the Extension course at its best. As television it was rather pedantic, and a good director for the show would have put more props in it and so forth, and made it a more interesting course. Such props as there were, grapes and maps and bottles, I got for them, but I'm not a professional director of television series. I think it really should be done again. As a matter of fact, the wine industry just now, January 1971, is doing a series of television shows live with one of their staff doing a part of the work on them, and I hope these will be a better sort of thing.

The other public forum of the University people was the Wines and Vines magazine, which was the only voice. Well, there was another one. There was the Wine Review which was published in Long Beach and the Wines and Vines magazine in San Francisco. Eventually these two magazines were amalgamated. And the staff wrote quite a number of articles for them.

Amerine: Professor Winkler, Dr. Olmo and I wrote a series of 12 articles on grape varieties, and Mr. Twight participated in one of those too, about 1937 or '38. I continued to write articles for them over the years and still do. There will be one in the forthcoming issue on grapes in the San Joaquin Valley, which is a semi-popular article.* We've also published technical articles in Wines and Vines.

I think that three general articles might be important. For example, one was for Scientific American about five or six years ago.** This was immensely popular. I taped the original article and then a friend of mine edited it, and then I re-edited it. It was perhaps the best single writing that I did in this vein. For the last seven or eight years I have written an annual article for San Francisco Magazine. One on Cabernet, one on Zinfandel, and one on how to judge wine. Last year my only fiction piece was published in San Francisco Magazine. A little satirical play on how people look at wine, which made some people very mad, I might say.*** [Laughter] I never got any direct reports on that.

The third one was an article which Chancellor Mrak, I suppose, foisted off on me. It was for Science magazine, which is the most prestigious American scientific journal, in their December 30, issue of 1966.**** I wrote a long lead article for that on the scientific aspects of the California industry, and this was very widely distributed in reprint form. Perhaps 1500 reprints of that single article went out to people, and that also was important.

I also contributed to an English journal called Wine and Food, which André Simon edited. There was

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*Appendix I, #289.

**Appendix I, #209. Appendix II.

***Appendix I, #268.

****Appendix I, #239.

Amerine: an article in there on Hillaire Belloc's poem on wine.* A number of articles on wine and English literature, and quite a large number of book review articles. These were pleasant to do and provided week-end sort of thing. One of those articles has never been finished and that's something I'll do some day. It's William Thackeray's attitude toward wine and what he thought of various wines and how often he used wines. I've done about five or six of the novels already, but he wrote too many novels to do it very fast.

[Before the recording was started, a question was asked about the booklet by Maynard A. Amerine and George L. Marsh, Wine Making at Home, published by Wine Publications of San Francisco in 1962.]

Teiser: I'm surprised that there is so much interest in it.

Amerine: Well, Sunset magazine in their little issue on home wines mentioned it, and I think that immediately gave it a big boost.

TEACHING AND WRITING

Amerine: Well, now as to other popular sort of things, about 15 years ago, I persuaded Professor Winkler to let me try an introductory course to the grape and wine industry. I taught this for two or three years. Not very many people took the course, maybe 15 a year. But we thought we might separate the grape part from the wine part and that this would be more popular, and Professor Olmo taught the grape part and I taught the wine part. This turned out to be exactly true. It immediately became much more popular. And when Dr. Singleton came on the staff in 1957 or '58, he didn't have any course to teach at that time, so I persuaded him to help me teach the course which by that time had, oh, 60 to 100 students. So we taught the course, and after a couple of years we put the

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*Appendix I, #151.

Amerine: lecture material into a book called Wine, An Introduction for Americans, which the University [of California] Press published and which has been quite popular since then.*

Teiser: May I add a note on that book: we are using that as our standard for form for this series of interviews.

Amerine: Good.... Particularly in its paperback edition, it's been quite popular. In fact, they've had some problems of keeping it in print apparently. We plan in another two or three years to do a second edition of that one.

I think that's about as much as I can say about popular sort of things and appearance in public. All the University people have at one time or another had to appear at hearings of various kinds. State Board of Public Health hearings when they were making changes. And I suppose some of the best writing I did was in some letters to the Wine Institute concerning some of the proprosals.

There's one very good letter in the files some place when the proposal was made to call muscatel a non-varietal wine, because there was a shortage of muscat. This was about 1939 or '40 that this happened. And it was quite seriously proposed that muscat was not a varietal wine and this would enable them to produce muscat without having 51 per cent muscat grapes in it. That letter compared the California wine industry to Orwell's 1984, that black is white and white is black. That apparently killed the discussion on that. They were afraid I'd get up and read my letter. [Laughter]

There were several other kinds of these things. The University kept quite a bit of its independence through these kinds of things, and I think also earned the respect of the industry for having independent opinions on a lot of things which differed sometimes from the industry opinions.

Now as to how to write a book [in collaboration], I've indicated earlier that we were literally directed to produce the first bulletins, 639, 651, and 652. And Professor Joslyn and I worked out a method of

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*Appendix I, #222.

Amerine: collaborating on these. We first each drew up an outline of what we thought ought to be done, and then we had several discussions of the outline, and then we distributed the work between us. One would take one part of the chapter in some cases and the other would take another one. And we would do our writing and exchange the material and rewrite each other's material.

Teiser: This was always when one of you was at Berkeley and the other at Davis?

Amerine: Yes. One at Berkeley and one at Davis. But we were moving back and forth quite easily at that time, and I particularly was in Berkeley some of the time doing some library work, so this was not difficult. Then after we each had rewritten, the whole thing was typed up in a format, and then we would meet and iron out the places where there were differences of opinion. This worked quite well. We really never had any real problem in that collaboration from the beginning 'til the table wine book this last year.

In the Singleton-Amerine book, the collaboration was based on the lecture material which we had already given. Of course I had worked out the outline beforehand. Dr. Singleton was very clever in expanding his lectures. The material on alcoholic fermentation in the book is entirely his, and also a good deal of the material on the effects of alcohol was material that he worked up. I would say that he quite independently developed the style of some of the chapters compared to the style that I used. And again after each one of us had a text, we exchanged the text, and rewrote as we thought necessary. Then we had it all typed up and then we went over it again, and ironed out those places where there were differences of opinion.

In the Cruess-Berg-Amerine technology book,* there already was an outline of Professor Cruess' to start with. I was asked by Professor Cruess to help him do this because he was out of touch with the current literature. So, we made a new outline following in general the material he had before, but I rewrote all of the European material. Some of the

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*Appendix I, #245.

Amerine: European material in the first edition of the Technology was more of a travel dialogue. Although it was interesting, it is not the kind of thing that I thought I would give in a technology book. So, I rewrote the whole European part to conform to an exposition of the factors influencing quality rather than just what the industry said about their wines. But Professor Cruess brought up to date all the yeast material and a good deal of the sulfur dioxide material and so forth.

Again we each divided responsibilities for certain parts, exchanged copies of the text. And then [we met] in Berkeley at Professor Cruess' home to iron out places where there were differences of opinion, and then have the whole thing typed up, and re-read it at that stage and finally adjusted any differences there might be, or where we had made omissions. There were very few cases where we had real differences of opinion. I can't remember any in that particular book, but there were places where one or the other of us would discover that we had left something out that was important to the text, and then it would be put in. So that most of the discussions were on where an article was published, or what needed to be put into the text.*

A great many of my articles have been with either my technician or some other member of the staff. I took the attitude that if they contributed in a significant way toward the conduct of the research, and if they actually had original ideas during the research, they should be recognized even though the project was mine and I was in charge. So that at one time or another practically all of my technicians had participated in one or more publications, and a great deal of work has been done with the staff. I published with practically all of the staff at Davis at one time or another--both the viticulture staff, and I guess with all the enology staff as far as I know.

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*See also pp. 33-34. "Mr. Harold Berg took Professor Cruess' place in the second and third (1972) editions and corrected and rewrote a number of sections." M.A.A.

WINE MARKETS AND WINE QUALITY

Amerine: Now you have asked me the question about the wine market in this country and how much demand there is for different quality levels. This is a subject of very great interest because the modern agricultural economist denies that there is any such thing as quality in foods and that it's all based upon price and an imagery, but that there is no real difference in quality in foods and so forth. I think that might be true of flour, it might be true of tomato juice--well, I'm not sure of even tomato juice--but I don't think it's true in the wine industry. This has a very long history so that unless we've been fooling ourselves for the last three or four hundred years or longer, there is such a thing as quality in wine.

Quality is very easy to recognize but very difficult to define. But I would say, in general, that the industry recognizes that the highest quality wines are made from the finer varieties of grapes, and the finer varieties of grapes are varieties of grapes that have unique and distinctive flavors. Or, where they have been processed by special processes and aged for long periods of time or aged in special ways. Those would all lead to quality.

Whereas you <u>can</u> make wine very simply from simple varieties of grapes which don't have very distinctive flavors in very large amounts, age them for short periods of time in very easy methods, and put them on the market. They will sell at very reasonable prices and they will not have very great quality level, in the sense of quality as meaning something distinctive, but they would be perfectly drinkable and useful wines.

I think we have that kind of wine market in this country and I think it's pretty well recognized. Although I suppose the larger producers feel that, since they sell more, the public recognize them as being the best wines. At least that's their public posture. I think if they were interviewed privately, they would have to say that just because we sell more Chevrolets than Cadillacs doesn't mean that Chevrolets are better than Cadillacs. The price factor, of course, is why more of the lower price

Amerine: wines are sold than the higher price wines. Although I would say that the quality level, in the sense of distinctive flavor and so forth, of our low price wine has increased remarkably since the war. And we are making much better standard wines--I think that's the word the industry likes to use--we are making much better standard wines now than we did before the war and perhaps than are available in any other country.

Now the whole question of the University's contribution to...

Teiser: Before you go on to that, may I ask you another question which relates to the quality. Is there sufficient economic incentive, and spiritual commitment or whatever on the part of some California winemakers to make great efforts to produce very high quality wines?

Amerine: Oh, yes! Right now we're in a period of dream world land, because there's thousands of acres of high quality grapes being planted now, and as I say, they're making commitments to sell Cabernets three years from now.

The demand is great. The public has recognized that the best California wines are made from fine varieties of grapes and the industry knows how to produce those wines. The trouble is that the demand is so great that's it very hard to get an old California Cabernet Sauvignon any more. They're sold out almost before they put them on the market. And that will last for another four or five years, I would predict. By that time we should have enough production of high quality varieties.

Yes, there are plenty of people who will make great wines as long as there is a demand for them, and right now there is a demand for them. A tremendous demand for them. Just unbelievable the demand that has developed for high quality California Cabernets, and Pinot noirs, and Zinfandels, and Rieslings, and Sauvignon blancs.

This is a reflection of the University's insistence in the variety research that I spoke about earlier, that you have to have better varieties if you are going to make better wines, and they have

Amerine: to be grown generally in good regions. You can't make high quality wines from the raisin and table grape varieties we now have. Some of our new varieties undoubtedly will produce high quality wines in other regions than the regions we are now using, and that's fine.

IMPROVEMENTS IN SHERRY PRODUCTION

Amerine: Another attempt to upgrade the California industry was the sherry work. Dr. Cruess was very much interested in the sherry work starting in 1937, and he and his students did a lot of work with the so-called film yeast type of procedure for making sherry. At least twenty wineries in the state at one time or another had experiments with the film yeast sherry, and some of these sherries came on the market just after the second World War, and were very good indeed. I remember an especially fine one that Inglenook produced.

But the wineries themselves never went into commercial production of film yeast sherries on a large scale. Most of these were just experimental lots that they'd make three, four, or five or ten barrels of, because they soon found that the film yeast process was very expensive.

On my return from Spain in 1948, I began to think about other methods of doing this that wouldn't require the small barrels and the long period of time and all the hand labor it took for the film yeast process. We developed at Davis the submerged culture method of making sherry which has been immensely popular, and an increasing amount of California wine is being made with submerged culture process. Essentially the process was to persuade the yeasts that since there was oxygen in the wine, that they could go ahead and grow and do the same thing that they did in the film. And that's they did.

They produced aldehyde quite well in very large containers as long as we kept the yeast stirred up and provided the right amount of air. Up to a hundred thousand gallons in three to six weeks, which would have taken a film yeast, in an immense number

Amerine: of small containers, three or four years to do the same sort of thing, or nearly the same sort of thing.*

There are some differences between the film yeast process and the submerged culture process. They resemble each other in that they both produce aldehyde. They differ from each other in that the film yeast process, because it stays in the barrel for a long time, has a considerable amount of the decomposition of the yeast going on, and this gives it slightly different flavor. Whereas in the submerged culture process, the whole process is over before the yeast decomposition has much chance to affect the results. So the submerged culture sherries are not as complicated as the film yeast sherries, but they are a very creditable product, and they provide a new kind of sherry for the California market.

Teiser: Are they being made commercially?

Amerine: They've been immensely popular now and there's quite a number of them on the market.

THE EXPERIMENTAL WINERY AT DAVIS

Amerine: Now, one of the earliest discussions which actually preceded my going to Davis was the question of how to make the experimental lots of varietal wines. Professor Bioletti drew up plans for a very large semi-commercial "experimental" winery. This was based on the idea that the dairy industry department had developed at that time, that in order to teach people how to become dairy plant operators they had to have a commercial dairy in operation. The Department of Dairy Industry, or the Division of Dairy Industry, at that time actually had a commercial dairy in Davis which distributed milk, made butter, made cheese, made ice cream, and distributed these to Davis and elsewhere, and Bioletti was of that opinion.

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*Appendix I, #128, #133, and #157.

Amerine: I made a little bit of research on this almost immediately when I got there, and calculated that we wouldn't get very many experiments done this way, because if the minimum lot was to be one hundred gallons, we just wouldn't have time to handle that. We would never get very much.

So, Professor Winkler and Mr. [William O.] Williams and I decided in July of 1935, within a few weeks after I arrived, that we would use small lots. Not as small as Hilgard had used. Hilgard had used some lots down as small as 20 pounds. We decided to standardize on something over a hundred pounds, and that we would then try and duplicate as many of these lots as we could, and see what variations we got from the duplications. And also get them out of these small containers into the glass very early in their life.

We did quite a large amount of this. We also arranged for some experimental lots to be made in large sizes in the wineries. As we'd go in to pick grapes, for example, at Inglenook throughout a patch of Cabernets and get our hundred pounds or two hundred pounds, and then the next day, Mr. [John] Daniel would pick that lot, and make it into a large lot. Then we would compare our wine with their wine as to the differences in quality from the same variety, from the same piece of ground at the same time of harvesting. The differences were generally rather small.

In general, the industry lots tended to be somewhat better than the Davis lots. So, that if the Davis lots were any good at all, our reasoning was the industry should do better than we did. So if we got a good result in our test at Davis, we could confidently make the recommendation for the industry because they ought to get better results than we got and not less. And since all of our lots were fermented on the same conditions, they were more or less comparable one from the other. This turned out to be quite true from year to year as well as within one variety or within another variety.

Later on, as the industry itself began to use more controls on the fermentation, the University made available funds for improving the conditions at Davis. First, we had only one controlled fermentation room at Davis for fermentation. Now we have two--one

Amerine: for the white wines and one for the red wines. One of the smartest things we did at Davis was to make a cellar in which the temperature was controlled at 52 degrees. This slowed down the rate of aging, it's true, but we never had any spoilage at Davis. We never had any fluctuations in temperature, and again we felt that if we got good results at Davis, the industry ought to get equally good or better results with their large size containers and their greater possibilities of temperature control.

At the present time there isn't any reason why quality wines couldn't be produced any place in California. As a matter of fact, I have produced wines in Venezuela where the average daily temperature is 80 degrees, and quite creditable wines. I made two trips down there and advised some people on how to make wine. It simply involves having more temperature control built into your tanks and into your fermentation rooms, and so forth.

The real problem of making high quality wines under warm climatic conditions is getting the high quality grapes to make them from. And that's not yet a solved problem by any matter of means.

TECHNOLOGICAL ADVANCES IN THE INDUSTRY

Amerine: Now you've asked me about some new developments and new things that have come into the industry since Repeal. I would say that Professor Cruess' early work, 1911 and 1912, on sulfur dioxide was not very well known by the industry immediately after Repeal. It hadn't had enough chance to sink in before Prohibition, and so that after Prohibition he literally had to resurrect all of that research.

The application of sulfur dioxide immensely helped the industry, particularly after 1936. They lost so much wine by spoilage in 1936 that everybody was converted to the use of sulfur dioxide thereafter. No winery in California operated without sulfur dioxide that I know of after 1936. The results were so disastrous that everybody realized that under California conditions, with our generally low acid content, that the use of sulfur dioxide was absolutely essential.

Teiser: In connection with sulfur dioxide, were there problems in levels? Were the levels ever too high?

Amerine: Not during the alcoholic fermentation. There was and still is some problem of getting people not to overdo the sulfur dioxide in the finished wine, which is another problem. Professor Joslyn and I have spoken out against this several times, and Joslyn five or six years ago wrote a special article for Wines and Vines pointing out the danger and disaster of using too high a level of sulfur dioxide. Even some of the quality wineries in California do this.

I had from a small, very prestigious winery just this week their Pinot Chardonnay wine. I brought the bottle to the office with some of the contents still in it, and analyzed it and found that it had 45 milligrams per liter of free SO_2. This is a high level, particularly for Chardonnay, and definitely reduced the quality of the wine.

The industry's comment on this is, however, that with SO_2, the wines can be shipped to almost any market without browning or darkening of color, that wines never cloud with the level of 30 or 40 milligrams per liter of free sulfur dioxide and that, in general, it's an insurance. But our response is that any fool can make wine with SO_2 if you raise the level high enough. So we generally frowned upon these excessive uses of SO_2.

Now the other development, of course, was to call attention to the importance of the yeast. This was never developed quite in the direction we'd hoped it would develop. We'd hoped that we might find several varieties of yeast that would modify the quality of the wine in measurable amounts. But we simply have never been able to do this. Professor Cruess never found any yeast that would do this and Dr. Castor at Davis tried it and never found any. We did a very large experiment in triplicate one year and couldn't find any chemical differences or any sensory differences that would be worthwhile propagating. In spite of this, they're still selling Tokay and Malaga yeast in California and so forth. But I think that's just commercialism rather than any real effects. Ralph Kunkee and I have had some recent experiments going on, using two different yeasts at the same time, and we've not been able to get any really very good results.

Amerine: The one big change in the yeast picture was Dr. Castor's suggestion that the yeast should be produced and distributed in a wet packed (pressed yeast) form. This caught on, unfortunately, after his death. The Red Star people in Minnesota began producing the Davis Montrachet strain of yeast and it's been immensely successful. Practically every winery in California now uses pressed yeast. They can get a very high inoculum of the yeast very quickly. It always comes exactly the same as produced by Red Star and it's much cheaper, because the yeast is produced by Red Star from molasses. Molasses is much cheaper than grapes.

Whereas in the old days we used to build up the yeast culture on grape juice, now the yeast culture is developed for us using molasses as the raw material, and then it is pressed out and there is no more molasses in it, and it's delivered in a pure form by the ton lot into California. It's kept under refrigeration. It's been very, very successful and Red Star and Dr. George Thoukis at Gallo certainly deserve a great deal of credit for industrializing the process. The original idea was Dr. Castor's and he actually did some experiments with it in connection with the yeast plant in Oakland right after the war before he died.

ENGINEERING ADVANCES

Amerine: The engineering part of the industry has been pretty largely carried on by the industry itself, because the University simply never had the funds to go into large scale development work. There are two exceptions to this, however. One was the development of the so-called serpentine or belt press which Agricultural Engineering and our department developed at Davis. And this is being used commercially now. It has a public patent on it. For certain kinds of operations, the serpentine press appears to be useful.

The second one was the development of the mechanical harvester, which was done by Professor Olmo in our department and the people in Agricultural Engineering. At least the prototypes of these were developed at Davis. First with [Lloyd H.] Lamouria

Amerine: and Winkler on one kind of machine, and then the one that is being used now, the so-called shaking machine. The shaking machine was first used in New York state for the Concord type of grapes because they drop off very easily. And the Davis contribution to this was to develop new machines that shook harder and develop training methods whereby the grapes could be forced off the clusters by the shaking machines without injuring the vines.

The industry has taken this up in a big way and the University machine is probably not going to be the machine that's going to be most popular. Food Machinery [FMC Corporation] and Mr. Johnson in Berkeley and other people are beginning to produce machines. There are three of them on the market now. They've been so successful here that a few of them have been sent to Australia and a couple of them have been sent to France already, and they undoubtedly will have major impact upon the grape industry.

Mr. [Cesar] Chavez feels that this is forcing people out of jobs and that therefore they should be recompensed for the jobs that they are losing by every one of the new machines. This, of course, sounds crazy in one respect, and in the other respect the machine does free the industry from the need of labor at a very specific time. In the long run we should be able to pick any vineyard in California at exactly the day and almost the hour that the grapes are at their optimum maturity by using these machines. So it might be worthwhile to just agree with Mr. Chavez that they would pay them for the people that are put out of work because, in return, you're going to have better grapes going into the wineries at better optimum maturity.

We simply don't have enough agricultural labor in California to pick all the grapes at ideal times. We certainly could have enough machines to pick all the grapes at the ideal time, and we probably will have--Chavez or no Chavez.

The third type of influence that we've had has been on the so-called washing or scalping machine, which Agricultural Engineering and Professor Berg have been instrumental in designing. There was an early theoretical paper by Berg and Guymon developing the theory of this, and from this then they have

Amerine: developed machines which will essentially scalp out all the sugar from the grapes. These are being commercially used now. Not as much as we thought, because as they get bigger some other engineering problems develop that the equations apparently didn't take care of. But I would think that perhaps there will be some new use of these machines and some bigger use of these machines in the near future.

The University had a negative effect also on some equipment. Pressure fermentations were highly recommended in Germany and they were used in Australia. And there was a great deal of interest on the part of the California industry in them. We did the basic research at Davis on them in this country and found out that with California grapes, the pressure fermentation didn't work. I suppose we saved the industry several million dollars by this negative report on the pressure tanks, and I am happy to say we were justified because the pressure tanks are disappearing in Australia now as well.

Teiser: Did you ever do any work on the Rietz disintegrator?

Amerine: No, we have not. In general, where the industry has worked out a machine, we felt that the wine industry itself should do the testing on that rather than the University. We just don't have a large enough operation to run the Rietz machinery. We'd have to have the minimum of ten tons of grapes. Whereas the industry can do that kind of research much better and does that kind of research much better. So that we have generally not tried to do that.

The new crushers of Valley Foundry have not been tested at the University because they take 300 tons an hour, so that just to run them ten minutes would take 50 tons. There's no point in our doing that kind of research since the industry can do it much better than we can.

NEW MATERIALS AND METHODS

Amerine: On the chemical side, the introduction of bentonite has been a tremendous impact on the industry. It was first tested on honey in the 1920's and [L.G.] Saywell heard about it, I think, from the honey and he tested it on vinegar and then on wine. At first there was some prejudice against the bentonite, but as the high quality Wyoming bentonite came into use, the industry gradually adapted bentonite as the clarifying agent of preference, and it's been adopted by everybody in the industry now.

I don't know of anybody in the industry who doesn't use at least some bentonite in the clarification process. Also it's been adopted in Germany, quite widely, and is now being used in France, also fairly widely. It's also being used in Soviet Union. So this was a development from the University which gradually spread throughout the industry and throughout the world. It's being used in Japan, I might point out also.

There was a very early report on the antiseptic effects of diethylpyrocarbonate, but this wasn't tested until some time in the forties at the Geisenheim station in Germany. They found that it would indeed kill yeast and that it decomposed primarily to carbon dioxide and water within 30 minutes. So this seemed like the ideal antiseptic agent for use in the wine industry. Particularly at the time of bottling because you could put in a small amount of what we call DEPC or diethylpyrocarbonate, and it would decompose and there would be no residue.

It turned out that this isn't quite true. There is a slight residue of diethylpyrocarbonate, which has a slightly fruity smell, and there is a very small formation of some other compounds that have slight flavor effects. But, in general, diethylpyrocarbonate or DEPC is a quite useful compound and is being quite widely used by the industry now in wines that have residual sugar. Because at the time of bottling 150 milligrams per meter of diethylpyrocarbonate is added to the wine. This sterilizes it. Gets the wine in a sterile condition as it goes into the bottle, and 95 or 96 per cent of all the diethylpyrocarbonate decomposes within 30 minutes

Amerine: and it doesn't seem to have any very harmful or any effect on the quality of the wine unless you use much higher doses than 200 or 250 milligrams per meter. The testing of that at Davis was done by [J.L.] Ingraham and [G.M.] Cooke. It is generally being used quite widely in the industry at the present time.

We then had some negative influences on the use of chemicals. A very large number of chemicals have been tried and not found useful. So the industry has not used them on our recommendation. We are still doing this kind of research all the time. Ascorbic acid was highly recommended but generally doesn't give the results that we would like. It leads to some undesirable effects on the sulfur dioxide and doesn't take the place of the sulfur dioxide, in addition, so the industry has been well warned against the use of ascorbic acid. Also we have warned the industry against the use of glucose oxidase as an oxygen scavenger, and this turned out to be exactly right, although it had been recommended in Europe. We saved the industry a good deal of money and headaches by pointing out the fact that glucose oxidase wouldn't do what they thought it should do.

The pectolytic enzymes Professor Cruess tested at Berkeley. He got varying results with them and finally they were re-tested by Professor Berg, and now it's generally recommended that they not be used. They lead to darkening of color and slight changes in the methyl alcohol content. The University does not now recommend that the pectolytic enzymes be used excepting in instances when we have exceedingly high pectin levels. So here was a case where the University changed its mind in route, but I think wisely.

There have been a number of other cases of this kind, not where we changed our minds, but where we recommended against the use of various chemicals. Sometimes very big companies have come to us with elaborate plans for the promotion of new compounds and so forth, and we've had to tell them that they weren't useful.

Sorbic acid is one that we had something to do with. The industry was very anxious to use sorbic acid as an antiseptic agent. But the threshold

Amerine: studies which we did at Davis showed very early that it had too much an effect on the odor, and too many people recognized it. Now we haven't persuaded everybody not to use sorbic acid yet, but most people have been well warned against it, and I think we've done exactly correctly on this because it does harm the quality of the wine.

Teiser: With all of this, what has been the change in pasteurization then?

Amerine: Well, pasteurization is no longer used as it was right after Repeal to prevent further spoilage of the wine, because we don't make spoiled wines any more. So pasteurization has disappeared as pasteurization. Heating is occasionally used, or a form of pasteurization, as an aid to clarification.

But generally speaking, most wineries don't even have pasteurizers nowadays. If they need to use heat as a method of clarification, they usually just run it through a tubular heat exchanger and warm it up to the desired degree to break the colloidal conditions and things like that. But I would say that most of the large wineries and all of the small wineries are not using pasteurization in any form at the present time.

Teiser: Is freezing used sometimes?

Amerine: Well, this is another place where the University has had some influence. The conditions for refrigeration were established by Joslyn and Marsh very early, and then they were reinvestigated by Berg and [R.M.] Keefer. They published the basic equations which govern the refrigeration of wines and the tartrate stabilization of wine. That work is well known and is widely accepted by the industry.

The University also got interested in ion exchange and did a good deal of testing on ion exchange as a method of stabilization of tartrates. A good many of the industry are using ion exchange as a method of tartrate stabilization now. The University has also been very helpful here in warning the industry against the overuse of ion exchange--that is, replacing more than is necessary of the potassium with sodium. So here is a process that we didn't originally develop--it was developed in Europe before

Amerine: we got hold of it here--which the industry would like to use and, I think, justifiably can use, but where the limit of use has to be very well established and enforced. This has not been as easy to do as we would like. But I would say, in general, the industry has not abused ion exchange.

Perhaps half of the wine is now stabilized with ion exchange and the other half is stabilized by cold treatment. These are two processes which are being used. The cold treatment of course has been used from time immemorial. There's nothing new about that. Ion exchange is, of course, a reasonably new process.

Teiser: When I said "freezing," was that an accurate...

Amerine: We would say refrigeration. It would be a better term, yes. We don't actually freeze wine to a sludge or anything like that. We cool it down to near the freezing point, but it doesn't do any good to cool it down any more. In fact, there's some theoretical advantages to keep it one or two degrees above the actual freezing point of the wine.

Teiser: My word, you have covered the whole list!

Amerine: Well, I talk rather fast.

Teiser: Yes, you do.

FOUNDATION GRANTS AND SABBATICALS

Teiser: One thing I did wonder about--I didn't know that Guggenheim grants were often given in such fields as yours, but you had one for a year, didn't you?

Amerine: Yes. They're given for anybody that they think can contribute to scientific and cultural aesthetic things and I think--well, Dr. Olmo had a Guggenheim to look for varieties of grapes in Iran, and I had the one for studying dessert wines around the Mediterranean. And I intended to write a book on it. That book is still in my head mostly, and in manuscript.

Amerine: There have been some Guggenheims to geneticists in Davis, one or two, to do genetic work. G. Ledyard Stebbins had it, professor of genetics. He had a Guggenheim at one time and Charles M. Rick, who is a geneticist on tomatoes, had a Guggenheim once. Not too many in agriculture, it's true, in general.

I don't know why that should be because I found the Guggenheim people very easy to deal with and very interested in the project. That may have been because a man by the name of Moe, who was the director general of the Guggenheim Foundation was a close personal friend of Farnham Griffiths, who was a Regent in the University. He was the former president of the Bohemian Club and a very close friend of mine. So after I had the Guggenheim, they often commented on how generous the Guggenheim Foundation was to be interested in wines. Moe's successor was a friend of mine, too. He was interested in wines. He used to write me little letters about wines that they had.

I never asked for a second Guggenheim because the Guggenheim does tie you down quite a good deal. You have to submit a project and if you take money, you have to give something back for it. So I never wanted to tie myself down for 13 months again for just one project. So to finance my last two sabbaticals, there was some lecturing, there was a congress to attend in '62. I did some lecturing in '69, so it wasn't altogether privately financed. I was free most of the time.

UNIVERSITY MEN AS CONSULTANTS

Teiser: Do you do any consulting work for the industry?

Amerine: No, the University has a strict rule in agriculture against consulting. We're on 11 months salary for that very reason. The consulting I did in Venezuela was done on vacation time and no money changed hands. They simply bought me a ticket to Venezuela and back, which was very nice of them, because I enjoyed the trip and I got to see the West Indies pretty thoroughly on the trip back.

Amerine: This, I think, is a good policy. On the other hand, the engineers and the doctors as consultant make good fees. [Laughter] Although the Davis medical staff does not consult. Their fees go into the medical school. They're on salaries. They're on straight salaries. They're not big salaries, but they have a special range. The professor of surgery, I don't know how much he makes, I've seen the salary scale that he makes $50,000 or something like that. Now in private practice he'd probably make $150,000, but on the other hand, he has an academic position, he doesn't have to operate any more than he wants to, his salary comes in all the time, and any fees that he collects go into the medical school.

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APPENDIX I - Published Writings of Maynard A. Amerine

Published writings:

1. What climate does. Winkler, A.J. and Amerine, M.A. The Wine Review 5(6): 9-11; (7):9-11, 16. 1937.

2. Color in California wines. I. Methods for measurement of color. Winkler, A.J. and Amerine, M.A. Food Research 3(4):429-438. 1937.

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[P: popular]

[T: technical]

From Scientific American
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APPENDIX II

WINE

This happy invention of man is a solution of hundreds of subtly interacting substances. Modern understanding of the wine-making process cannot explain a great wine but guarantees a good one

by Maynard A. Amerine

Wine is a chemical symphony composed of ethyl alcohol, several other alcohols, sugars, other carbohydrates, polyphenols, aldehydes, ketones, enzymes, pigments, at least half a dozen vitamins, 15 to 20 minerals, more than 22 organic acids and other grace notes that have not yet been identified. The number of possible permutations and combinations of these ingredients is enormous, and so, of course, are the varieties and qualities of wines. Considering the complexity of the subject, it is not surprising that perhaps more nonsense has been written about the making, uses and appreciation of wine than about any other product of man or nature.

Nevertheless, it can be said that in the 20th century wine making has become a reasonably well-understood art. The chemical processes involved are now sufficiently known so that the production of a sound wine is no longer an accident (although the production of a great wine may still be). For this we are indebted primarily to Louis Pasteur, who founded the modern technology of wine making along with several branches of chemistry, microbiology and medicine. Pasteur put the making of wine (and of beer as well) on a rational basis by explaining fermentation, which for thousands of years had been an unsolved mystery.

It seems likely that man's discovery of wine came later than that of beer (a fermentation product of grain) or of mead (a fermentation product of honey), because grapes grow only in certain climates and environments. By Neolithic times, however, the peoples of the Middle East were well acquainted with the fermented juice of the grape, and one of the oldest inscriptions in Egypt (on the tomb of Ptahhotep, who lived about 2500 B.C.) depicts the making of wine. The "blood of the grape" attracted ancient man not only as a beverage but also as a medicine and a symbolic offering to the gods.

The grape is its own wine maker. One simply pressed out the juice, let it stand, and its sugars turned into alcohol. Not until the 19th century did chemists begin to unravel the nature of this process. In 1810 Joseph Louis Gay-Lussac made the first crucial contribution toward solution of the mystery by discovering the general chemical formula of the breakdown of sugar into alcohol and carbon dioxide: $C_6H_{12}O_6 \rightarrow 2\,C_2H_5OH + 2\,CO_2$. Plainly this change did not take place spontaneously. What caused the sugar to break down? Gay-Lussac conjectured from his experiments that the process was stimulated somehow by oxygen. The German chemist Justus von Liebig put forward another hypothesis: that the fermentation arose from the "vibrations" of a decomposing "albuminoid" substance. Liebig's authority was so powerful that his view was not seriously challenged until the young Pasteur embarked on his studies of fermentation in the 1850's.

The Role of Yeast

"How account," Pasteur asked, "for the working of the vintage in the vat?" With his gift for designing experiments that went to the heart of the matter, Pasteur soon demonstrated that the working was produced by the microscopic organisms known as yeast. "Fermentation," he concluded, "is correlative with life." He showed that an infusion of yeast would convert even a simple sugar solution into alcohol, and he went on to identify some of the factors, such as acidity or alkalinity, that controlled the metabolic activities of the yeast organisms and thus determined the properties of a wine. Pasteur announced his main discoveries in two historic papers: *Mémoire sur la fermentation appelée lactique* (published in 1857) and *Études sur le vin* (1866).

How does the grape acquire its yeast? As every gardener knows, the skin of growing grapes is covered with a delicate natural bloom. It consists of a waxy film that collects cells of molds and wild yeasts, which are deposited on the grape by agencies such as the wind and insects. The skin of a single grape may bear as many as 10 million yeast cells. Of these, 100,000 or more are cells of the varieties called wine yeasts, of which the principal one is *Saccharomyces cerevisiae* var. *ellipsoideus*. It is the enzymes of the wine yeasts that are responsible for the fermentation of the grape's sugars to alcohol and for the creation of the numerous by-products that partially account for the flavor and other properties of the wine. The nature of the activity of the yeasts importantly affects the wine's quality, consequently it is one of the factors modern wineries are careful to control. In some old European vineyards the grapes and yeasts seem to have established over the centuries a natural harmony that brings out the grapes' best qualities in the wine. But most wineries, even in Europe, now improve on nature by adding pure cultures of desirable yeasts and using chemicals to sup-

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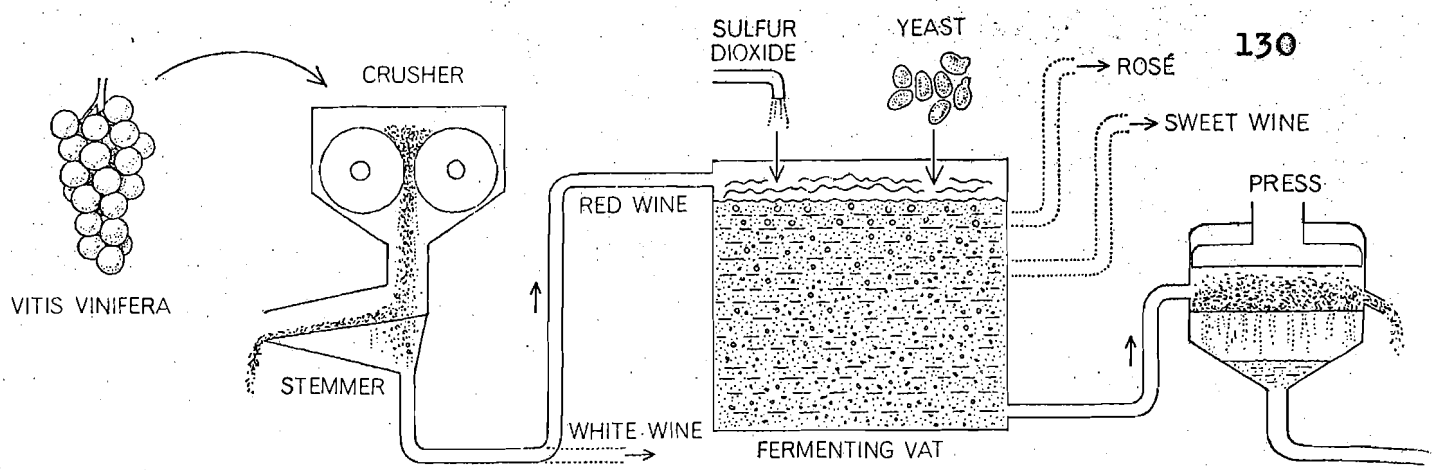
CALIFORNIA VINEYARDS cover the hills surrounding the Napa Valley. Varieties of *Vitis vinifera*, the species of grape from which most European wines are made, adapt readily to the warm California environment.



WESTERN U.S. METHOD of producing red wine duplicates the European process. The grapes are crushed between rollers (*left*), forming an intermediate product known as "must." The must is piped to a fermenting vat where yeasts speed the transformation

press the growth of undesirable yeasts present on the grape skins.

The Effect of Climate

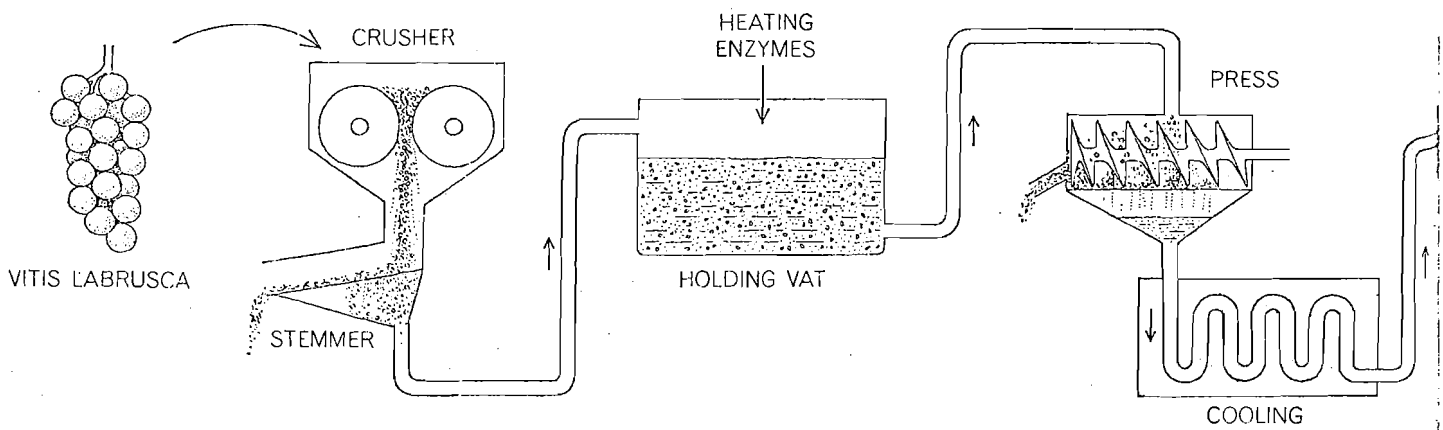
The making of a wine starts long before the grapes reach the winery—indeed, long before the grapes are harvested from the vine. The grape is a complex product of soil, water, sun and temperature. Of these factors, the most significant single one is temperature. Grapes will grow only within the belts of the Northern and Southern hemispheres where the average annual temperature is between 50 and 68 degrees Fahrenheit [*see lower illustration on page 56*]. Even in these regions the European grape *Vitis vinifera* does not survive in areas marked by certain unfavorable conditions: summer temperatures not warm enough to ripen the fruit (as in most of Britain), high summer humidity that excessively exposes it to mold diseases or insect predators (as in the southeastern U.S.) or late spring frosts (as in the northwestern U.S.).

The ideal climate for wine grapes is one that is warm but not too warm, cool but not too cool. On the one hand, a long growing season is required so that the grapes will produce a high content of sugar for conversion into alcohol. On the other hand, comparatively cool temperatures are desirable because they produce grapes with high acidity, an important contributor to the quality of wine, particularly the dry table wines. Both of these climatic conditions are well fulfilled in areas such as the Bordeaux district of France, northern Spain, central and northern Italy, Yugoslavia and northern California—and those areas produce fine red table wines. In areas with cooler or shorter growing seasons, such as Germany, Switzerland, Austria, the eastern U.S. and even the Burgundy district of France, the grapes in some years do not develop enough sugar, and sugar must be added when they are brought to the winery. This addition cannot, however, replace flavor components that are missing when the grapes have not ripened fully. The variability of the summer climate in Europe is the main reason for the fluctuation in the quality of its wines from year to year and for the emphasis on vintage years.

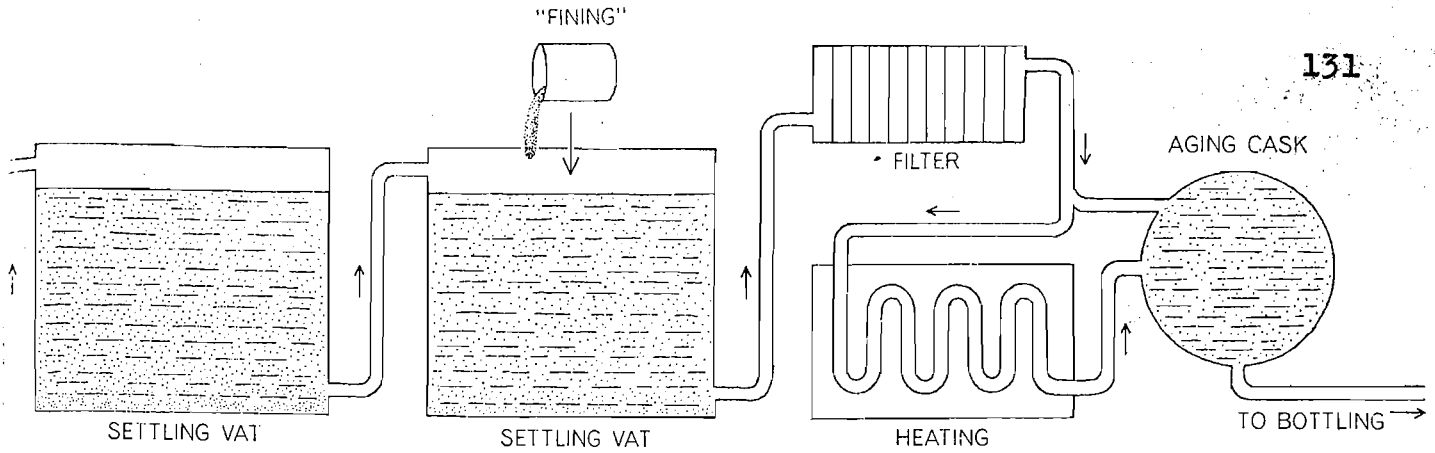
Although a warm climate (such as that of southern Spain, Sicily, Cyprus and southern California) produces grapes with a high sugar content, they have the handicap of comparatively low acidity. These grapes are suitable for the sweet dessert wines, but they lack the subtle flavors and color of grapes grown in cooler areas. Moreover, they are sometimes overripe when they come to the fermenting vats, with sad effects on quality if one attempts to produce a table wine from them.

The Grape

No less important than the characteristics of the climate are the char-



EASTERN U.S. METHOD of producing red wine begins with the crushing (*left*) of *Vitis labrusca* grape, a species low in sugar. Must is piped into a holding vat, where enzymes are added to break down mucilaginous substances in and around the pulp. The desired color



of sugars into alcohol, and then to a press where skin and seeds are separated out. The juice proceeds through two settling vats, wherein the "fining" process removes impurities. It is filtered, sometimes heated and cooled, and aged in casks prior to bottling.

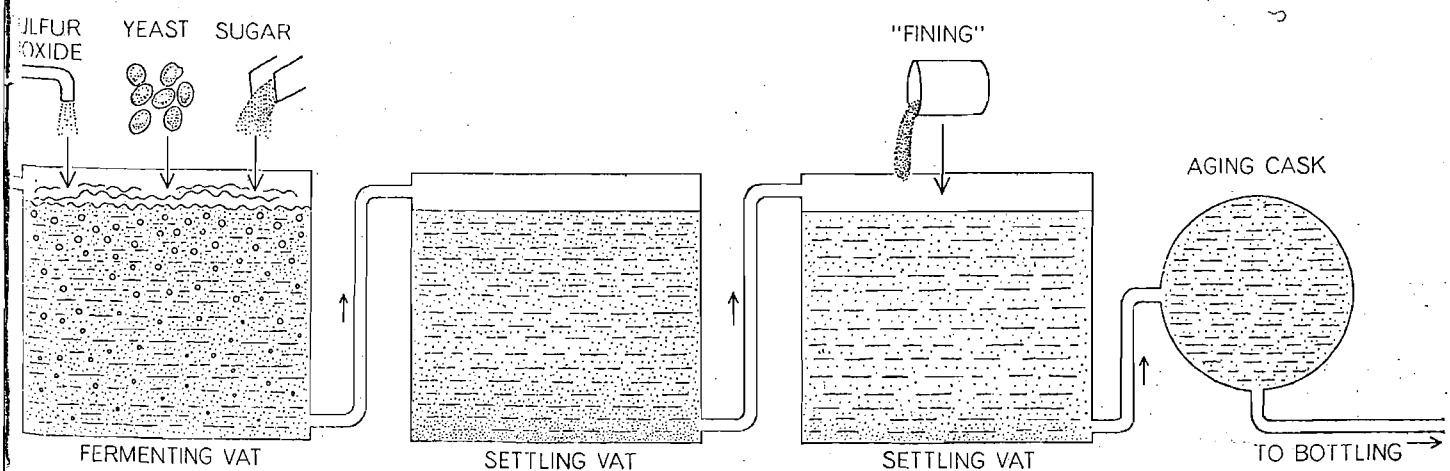
acteristics of the grape. One of the benign aspects of the grape plant—which holds much promise for future wines—is its great variability. One species alone, *Vitis vinifera,* has some 5,000 known varieties, and even the less popular species are available in about 2,000 varieties. Grape breeders have also produced many hybrids between the species. The grape varieties differ in color (white, green, pink, red or purple), in the size of the grape clusters, in the texture of the grape (firm and pulpy or soft and liquid), in sugar content, in acidity, in earliness or lateness of ripening and in susceptibility to insects and diseases. With this variability in the material, plant geneticists look forward to breeding new varieties of grapes that will be tailored to specific climates, to the types of wine and to new heights of taste, aroma and bouquet. (As wine experts define the terms, aroma refers to the fragrance of the grape; bouquet, to the fragrance imparted by fermentation and aging.)

Vitis vinifera is by far the preponderant species of wine grape grown in vineyards throughout the world. The plant is believed to have originated near the shores of the Caspian Sea in what is now the southern U.S.S.R. From there early travelers and traders spread it around the Mediterranean, then to northern Europe and eventually explorers transported it to continents overseas. (More than 81 percent of the world's vineyard acreage and wine production are still concentrated, however, in Europe and North Africa, with France the leader.) In the U.S. the *vinifera* species has found a hospitable home in California, and some 100 varieties of this species are cultivated commercially there. *Vinifera* is vulnerable to the diseases and insects that thrive in a hot and humid summer climate; for this reason many vineyards in the eastern U.S., Canada, Brazil and certain areas in Europe cultivate other species, such as *Vitis labrusca* or *Vitis rotundifolia.*

Now let us examine the wine-making process. To follow it in detail we shall consider the typical procedure in a modern California winery.

The Wine-making Process

To begin, let us analyze the raw material. In a mature grape about 10 to 20 percent of the material by weight is accounted for by the skin, stem and seeds, and the remaining 80 to 90 percent is pulp and juice. The pulp and juice, when piped into the fermenting vat, is called "must." Chemically the grape must is mostly water, but between 18 and 25 percent by weight is sugar (the amount varying with the variety and ripeness of the grape). The sugar consists mainly of dextrose (that is, glucose that rotates polarized light to the right) and levulose (or fructose, which rotates polarized light to the left). The grapes from which table wines are made usually contain dextrose and levulose in about equal



is attained by heating. Must proceeds to a fermenting vat where sugar as well as yeast and sulfur dioxide are added. Removal of impurities by fining takes place in settling vats, and the wine is then aged. Some Eastern wines are pasteurized before bottling.

amounts; for sweet wines vintners would prefer grapes with a higher proportion of levulose, because it is nearly twice as sweet as dextrose. In addition to these two principal sugars, grapes also contain small quantities of other carbohydrates, such as sucrose, pentoses and pentosans.

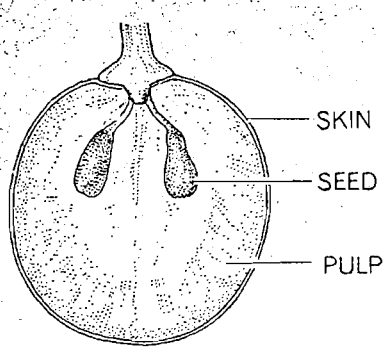
Acids make up between .3 and 1.5 percent of the grape must by weight. The two principal acids again are optically opposite forms: dextrorotatory tartaric acid and levorotatory malic acid. There are also small amounts of other acids: citric, oxalic, glucuronic, gluconic and phosphoric. The *p*H, or active acidity, of mature *Vitis vinifera* grapes in California runs between 3.1 and 3.9.

Among the many other substances that have been identified in analyses of grape must are 20 amino acids (found in the free state as well as in proteins), 13 anthocyanins (the pigments of many colored flowers), other pigments, tannins, odoriferous compounds and the various vitamins, enzymes, minerals and other ingredients already mentioned. Obviously many of these substances contribute to the making of wine by providing nutrient for the fermenting yeasts. The contributions of individual ingredients to the quality of wine, however, are imperfectly understood; presumably no one will ever be able to write a formula for a perfect wine, because personal taste is an indispensable part of the equation.

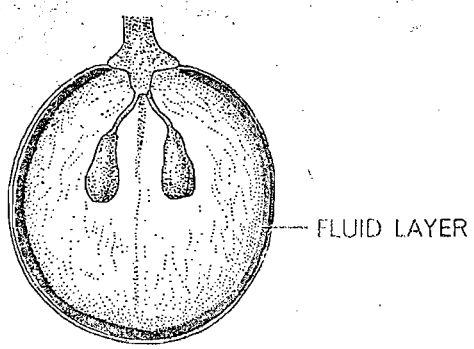
The fermentation process is enormously complicated [*see illustration on page 53*]. The breakdown of glucose alone involves no fewer than 22 enzymes, six or more coenzymes and magnesium and potassium ions. A number of other sequences, including the well-known Krebs cycle, participate in the process. From these many reactions emerges a mixed collection of other products in addition to alcohol, among them acetaldehyde, glycerol, succinic acid, esters and other aromatic compounds. The problem of the wine maker is to control the production and accumulation of this multitude of diverse products. In a modern winery this is done by various chemical and physical means.

Grapes have to be taken from the vine to the winery as quickly and carefully as possible in order to minimize their loss of water and sugar after picking and to prevent spoilage. At the winery they are immediately put in a crusher, which crushes the skins, freeing the pulp and juice (without breaking the seeds), and removes the stems. In the case of a white wine the juice is pressed out at this point and sent alone to the fermenting vat. For the making of red wine the entire contents of the crusher—juice, pulp, skins and seeds—go into the fermentation process. The red wine will take its color from the pigment in the skins and its strong flavor and astringency from tannins and other substances in the skin and seeds. (The rosé wines that have become more popular in recent years are made by starting the fermentation with the skin and pulp present, then, after about 24 hours, pressing out the juice and letting it complete the process alone.)

DELICATE BLOOM of grape skin consists of a waxy film that collects molds and yeasts. A single grape may accumulate 100,000 yeast cells with enzymes responsible for fermentation. Where the waxy film has been brushed off several grapes (*center*) a bright shine results.



CABERNET FRANC, shown here in cross section, is an Old World grape of relatively low acidity that flourishes in California.



CONCORD GRAPE of the northeastern U.S. has a mucilaginous layer separating skin and pulp, hence its "slip skin" classification.

Wine in the Vat

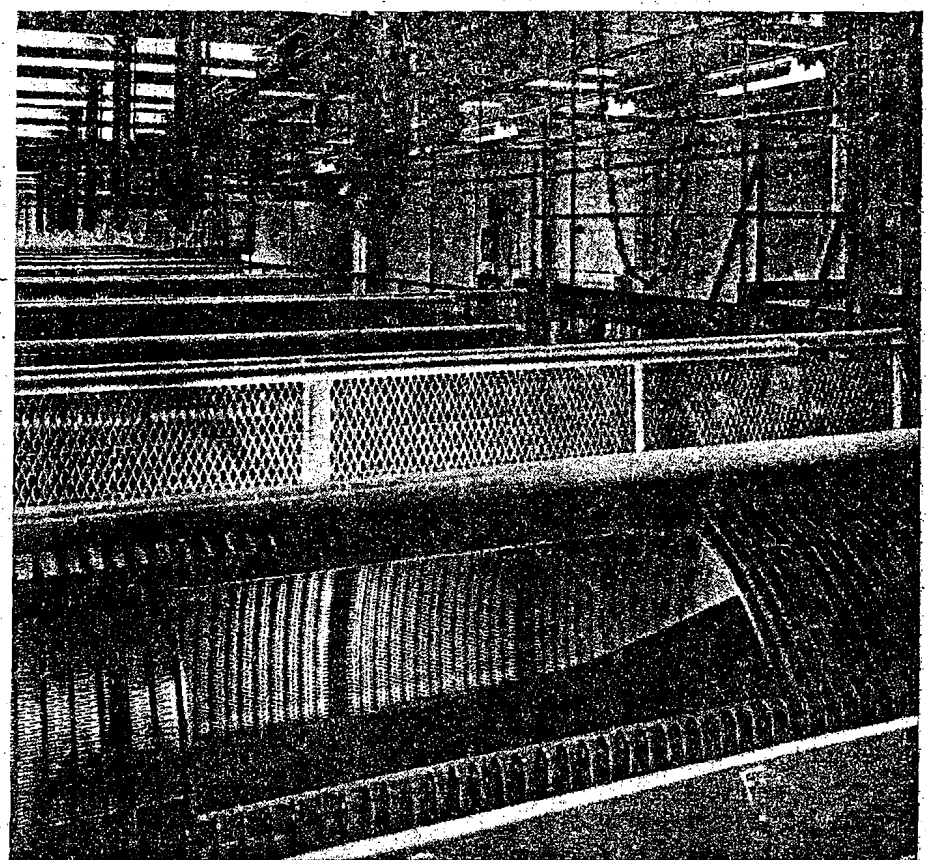
In the fermenting vat (in California it is usually constructed either of red-

wood or of concrete) the first step is treatment of the must with liquefied sulfur dioxide or a sulfurous acid or salt. The main function of this chemical is to inhibit the growth of the wild yeasts on the grape skins. They are replaced by the addition of pure cultures of yeasts that will produce a better wine. Besides suppressing the deleterious yeasts the sulfur dioxide reduces oxidation (which may have a baneful effect, particularly on the quality of white wines) and also helps to acidify and clarify the wine. Sulfur dioxide is a dangerous tool—an excess of it will ruin the wine—but all in all its use has been a major 20th-century benefit to wine making, contributing in various ways to better regulation of the fermentation, a higher yield of alcohol from the sugar and a more flavorful product. When sulfur dioxide is used, the natural yeast flora from the grape are largely inhibited and an actively fermenting culture of yeast must be added.

Another recent innovation is careful control of temperature in the fermenting vat. Cooling systems are used to carry off the heat produced by fermentation so that the temperature in the vat is kept below 85 degrees F. (for red table wines) or below 60 degrees (for white wines). The slow fermentation at low temperatures produces more esters and other aromatic compounds, a higher yield of alcohol and a wine that is easier to clear and that is less susceptible to bacterial infection. In the opinion of most enologists it results in a better bouquet and aroma. The duration of the fermentation in a modern winery varies from a few days to a few weeks, depending on the temperature, the type of yeast used, the sugar content of the grapes and the kind of wine to be produced.

All wine is divided into two general classes, defined by the alcohol content. The table wines (also called "dinner," "dry" or "light" wines) contain not more than 14 percent of alcohol by volume. The "aperitif" and "dessert" wines (sherry, port, muscatel and the like) have a higher content, usually about 20 percent. They are given this high alcohol content by the addition of brandy distilled from wine. Added during the fermentation, the brandy stops the action of the yeast, and the wine is then left with some of its sugar unconverted to alcohol. In the making of muscatel, for example, the brandy is added and the fermentation halted when the juice still contains 10 to 15 percent of grape

RECEIVING TANKS at left transfer must from a crusher on the floor above to the holding vats at right, enabling the winery to process the harvest of two types of grape. This photograph and the one below were made at the Taylor Winery in Hammondsport, N.Y.



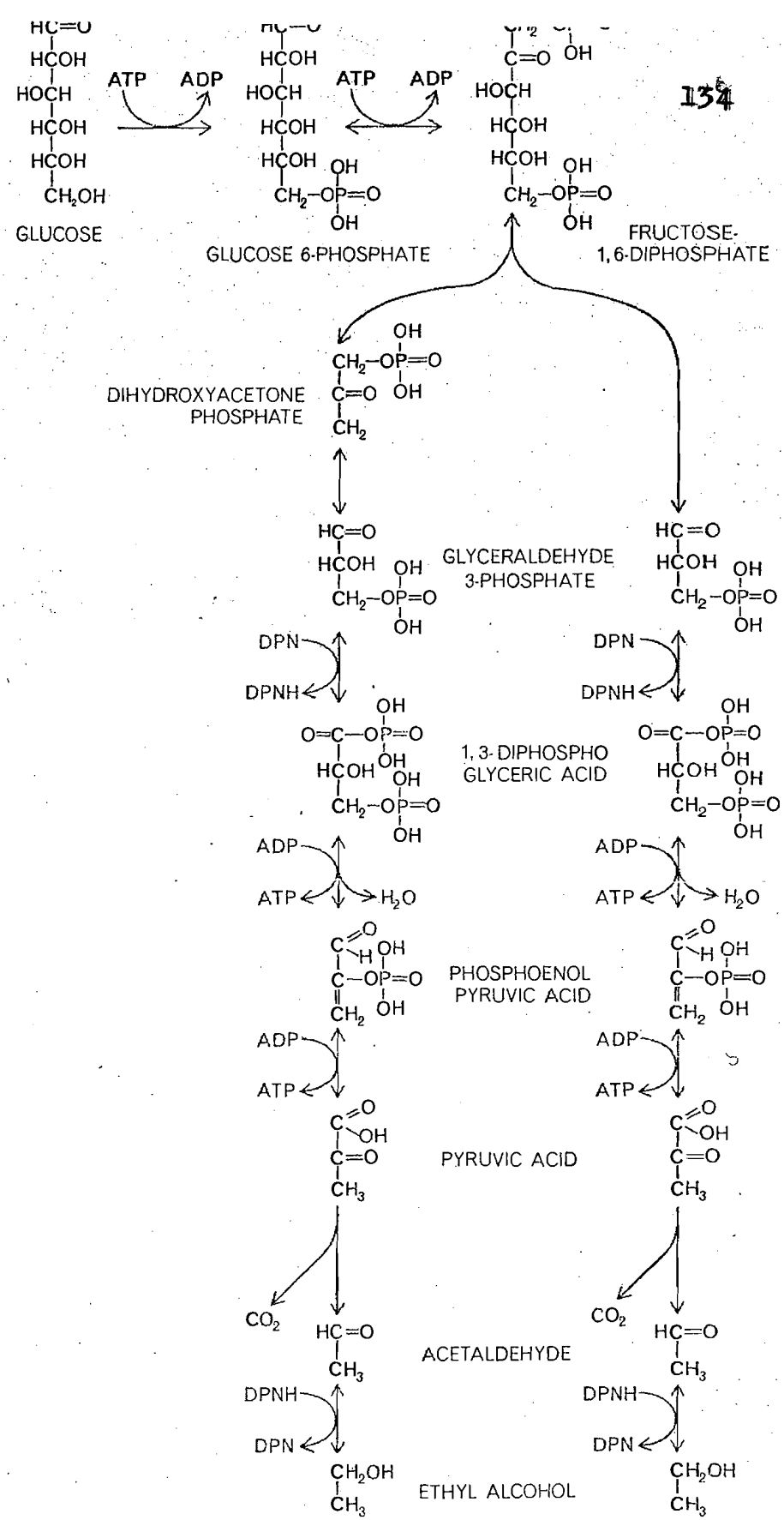
PRESSES receive crushed grapes from holding vats on the floor above through pipes (*top*). The black rubber bag visible inside the press in the foreground will be inflated with air, forcing residual skins and seeds to cling to the sides of the stainless steel cylinder.

sugars by weight, the result is a very sweet wine. For port the fermentation is stopped a little later (at a sugar level of 9 to 14 percent) and for a dry sherry it may be allowed to proceed until the sugar content is 2.5 percent or less.

For the sake of simplicity let us proceed with the more typical case of a red table wine. When part of its sugar has been converted to alcohol and adequate color has been extracted from the skins, the partially fermented juice is separated from the pulp. At this time the skins are mainly free and floating on top; the liquid is drained off as "free run" and is considered to make the best wine. The rest of the juice is pressed out of the pulp by the familiar wine press (which most people confuse with the machine used to crush the grapes before they are put in the fermenting vat). The press used in many modern wineries still looks much as it has always looked—a hardwood container with a plunger—but nowadays a hydraulic ram replaces the old screw contrivance turned by hand. Recently developed cylindrical presses and roller presses are also in use.

The juice now proceeds to the completion of its fermentation and to the clearing and aging stages. Not to be guilty of omitting entirely from this account the important category of sparkling wines, I shall merely mention here that they are made from dry table wines by means of a secondary fermentation in a closed container, involving the addition of a calculated amount of sugar and 1 percent of a pure yeast culture. This fermentation produces the extra carbon dioxide—amounting to an internal pressure of four or five atmospheres in the bottle—that accounts for the fizz of champagne.

For clarification of the wine the fermented juice goes to settling vats. There the suspended yeast cells, cream of tartar and small particles of skin and pulp rapidly settle out of the liquid. Various chemical processes and a form of fermentation still continue, however. Wine, it has been said, is a living thing, and indeed in a sense it does go on growing and maturing—in the settling vats and later in its aging periods in cask and bottle. In the vats the yeast cells, as they break down, particularly in a wine juice of high acidity, stimulate the growth of *Lactobacillus* bacteria. Enzymes from these bacteria decarboxylate the wine's malic acid (that is, remove COOH groups) and convert it to lactic acid. This malo-lactic "fermentation," replacing a strong acid with



FERMENTATION entails the breakdown of the six-carbon sugar, glucose (*top left*) and the consequent production of alcohol. The splitting of the carbon backbone occurs when the intermediate product, fructose (*top right*), gives way to two molecules of glyceraldehyde phosphate. The major intermediate products are shown from top to bottom. The enzymes and coenzymes needed to power the process are represented by ATP and ADP, and DPN and DPNH. The reversible steps in the process are indicated by two-way arrows.

a weak one, mellows the high-acid wine. Without it the high-quality wines of northern Europe could not be made.

As soon as possible the clearing wine is racked, or drawn off, from the settling lees to prevent excessive working and protect its flavor. The racking is repeated again and again, leaving behind lees at each step. During these off-pourings the wine also sheds the carbon dioxide with which it was charged in the fermentation process and absorbs oxygen from the air, which will help in its aging. To assist the clearing of the wine when racking alone does not suffice, wineries commonly inject "fining" substances (such as bentonite clay, gelatin, isinglass or egg white) that clump and precipitate the tiny particles in the wine; they may also apply pressure filtration, heat or chilling as aids to clearing.

Wine in Cask and Bottle

The aging of the wine begins in an oak cask. It is an extremely complex process of oxidation, reduction and esterification. The new wine gradually loses its yeasty flavor and harshness, declines in acidity and acquires a complex, delicate bouquet. As its pigments and tannin are oxidized, red wine turns a tawny color and white wine develops an amber hue. The amount of oxidation of its ingredients, by means of oxygen absorbed through the pores of the cask, is crucial to the eventual quality of the wine: the length of time it is left in the cask may make the difference between allowing a great wine to attain its potential and turning it into an ordinary one. If wine is bottled too soon, it may spoil or mature too slowly; if it is bottled too late, it will be vapid and off-color. The decision as to when to bottle is one of the most important in the wine maker's art. In present practice fine red table wines are kept in wooden cooperage for at least two years; white wines, from a few months to two years. Lesser-quality wines are stored in redwood, concrete or lined iron tanks.

After bottling, wine does not cease to "work." Aging in the bottle serves to eliminate the aerated odor the wine acquired at the time of bottling, reduce the wine's content of free sulfur dioxide and improve its bouquet. It is a mistake, however, to suppose the older the wine, the better, or that a bottle encrusted with the grime of many years is likely to contain a wine of rare distinction. The contents may, in fact, have become worthless long ago. Only a few very fine red wines benefit from prolonged aging. As a general rule, for a good red wine five to 10 years in the bottle is long enough, and a white wine will have reached its peak after two to five years. Wines of lesser quality require less time.

To summarize, the modern technology of wine making began with Pasteur's discovery that fermentation was produced by yeasts and that the process was far more complicated, with many more by-products, than Gay-Lussac's simple formula for the conversion of sugar to alcohol had suggested. The major modern developments have been the use of selected pure yeasts, the breeding and cultivation of superior varieties of grapes, the control of fermentation by certain chemicals and physical conditions (such as sulfur dioxide and cooling) and a gradual accumulation of more exact knowledge about the chemistry of the fermentation and aging processes. For all these advances, a truly great wine is still more or less a happy accident arising from time to time out of a particularly fortunate blend of the weather, the grape and the vintner's intuitive art. Much of the guesswork has been eliminated, however, from commercial wine making, and the quality of wines is a great deal more uniform than it used to be.

The Uses of Wine

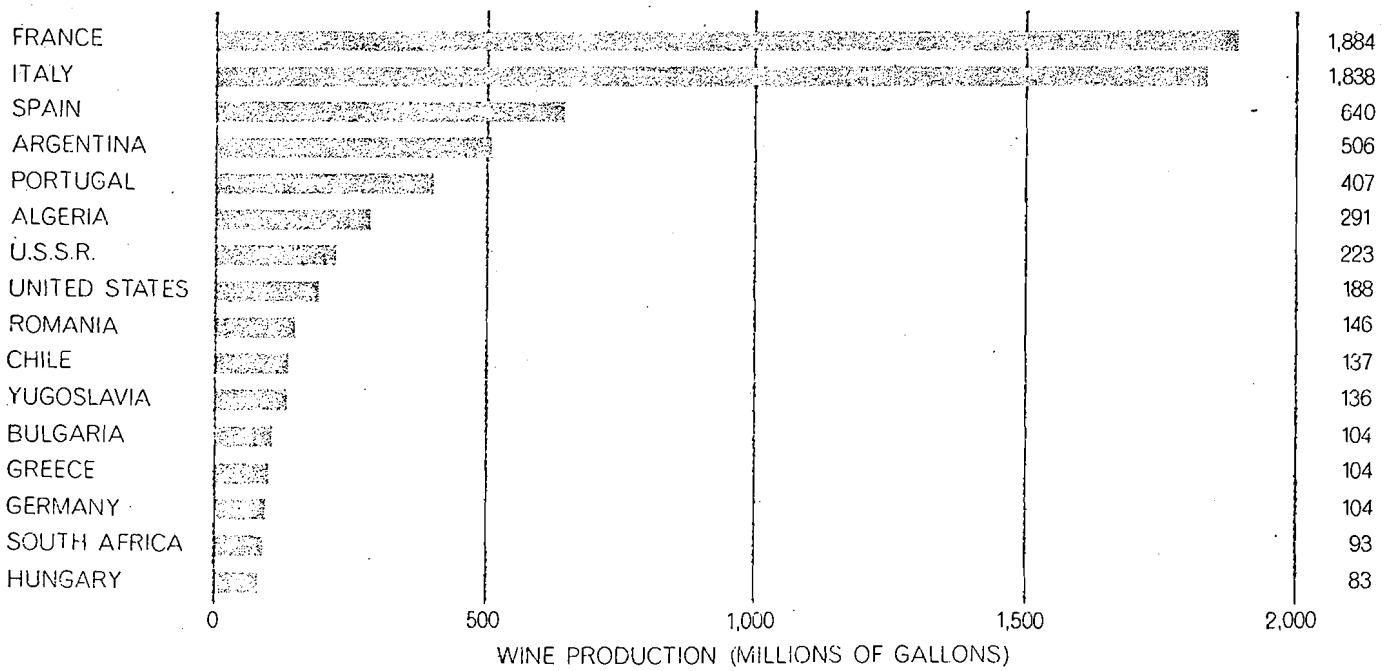
Even a brief account of wine making, which can touch only on the highlights, cannot pass over the fascinating subject of the consumption of the product. The wine maker and the wine consumer are themselves partners in a peculiarly intimate symbiosis; indeed, historically they used to be one and the same person! Modern enology sheds interesting light on some of the folklore of wine drinking.

The matching of wines to food (red wine with red meat, white wine with fish) cannot be defended, objectively speaking, as much more than a superstition. It is true that red wine shares with meat a complexity of taste and texture, and that the high acidity of white wine may add spice to the blandness of fresh fish and, in earlier times of nonrefrigeration, may have helped to mask the odor and taste of decaying fish. Most likely, however, the traditional ideas about food-wine pairing grew originally out of the simple geographical fact that a particular type of wine happened to be grown in a region that favored a particular food; that is, the coupling developed from agricul-

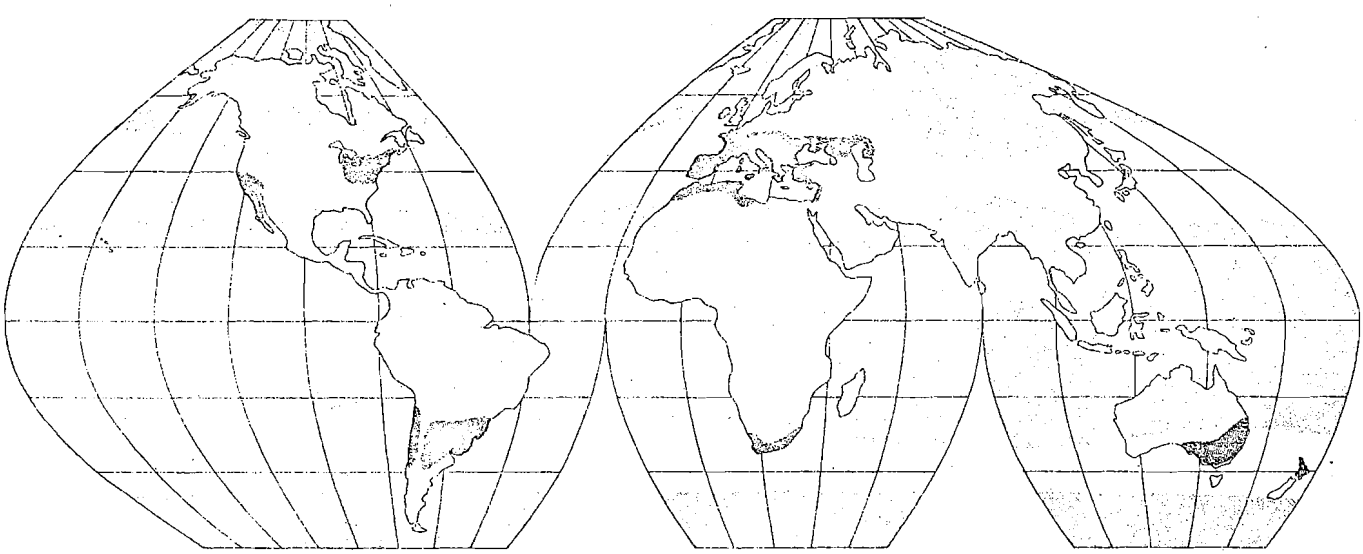
tural rather than epicurean considerations.

The use of wine as medicine is another and much more interesting story. The medical historian Salvatore P. Lucia, of the University of California Medical School in San Francisco, asserts in his *A History of Wine as Therapy* that it is "the oldest of medicines." Salves made with wine were used in Sumer as early as the third millennium B.C., according to a clay tablet found in the ruins of Nippur. Virtually every culture has employed wine for medicinal purposes, either directly or as a solvent. It used to be listed in the U.S. *Pharmacopeia*, but it was dropped during prohibition (which all but killed the appreciation of wine in the U.S.) and has not been reinstated since. Many physicians, however, have resumed prescribing it for various ailments.

Wine is considered a specific for certain disorders because its alcohol is absorbed from the digestive tract into the bloodstream slowly (as opposed to the rapid absorption of pure ethyl alcohol) and because some of its ingredients may be metabolically helpful to the body. The physicians who believe in its therapeutic powers recommend it variously as an analgesic for minor pain, as a tranquilizer or sedative, as a vasodilator for hypertensive patients, as a diuretic, as a nutritional supplement for diabetics and as an aid to the absorption of fat by the intestines after an operation for ulcers or stomach cancer. The noted medical teacher William Dock, professor of medicine at the Downstate Medical Center of the State University of New York, has remarked: "It is useful to think what would happen if alcohol should be discovered all over again.... The sales for all other sedatives and tranquilizers would go down; there would be four-page spreads with color in all the medical journals... and the stock of the patent licensees would go right through the ceiling on Wall Street. The lucky discoverers would get every possible honor, as did the men who discovered insulin."



LEADING PRODUCERS of wine are listed according to 1962 output in millions of gallons. The figures for Algeria, the U.S.S.R. and Chile are estimates. No statistics are available for China. France and Italy together produced about half of the world supply.



WINE-GROWING REGIONS of the world lie within belts where average annual temperature is between 50 and 68 degrees Fahrenheit. The hot summer of the southwestern U.S. and the humidity in the Southeast preclude the cultivation of *Vitis vinifera* grapes.

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Grape Varieties Mentioned in the Interview

Ruth Teiser

Grew up in Portland, Oregon; came to the Bay Area in 1932 and has lived here ever since. Stanford, B.A., M.A. in English, further graduate work in Western history. Newspaper and magazine writer in San Francisco since 1943, writing on local history and economic and business life of the Bay Area. Book reviewer for the San Francisco Chronicle since 1943. As correspondent for national and western graphic arts magazines for more than a decade, came to know the printing community.