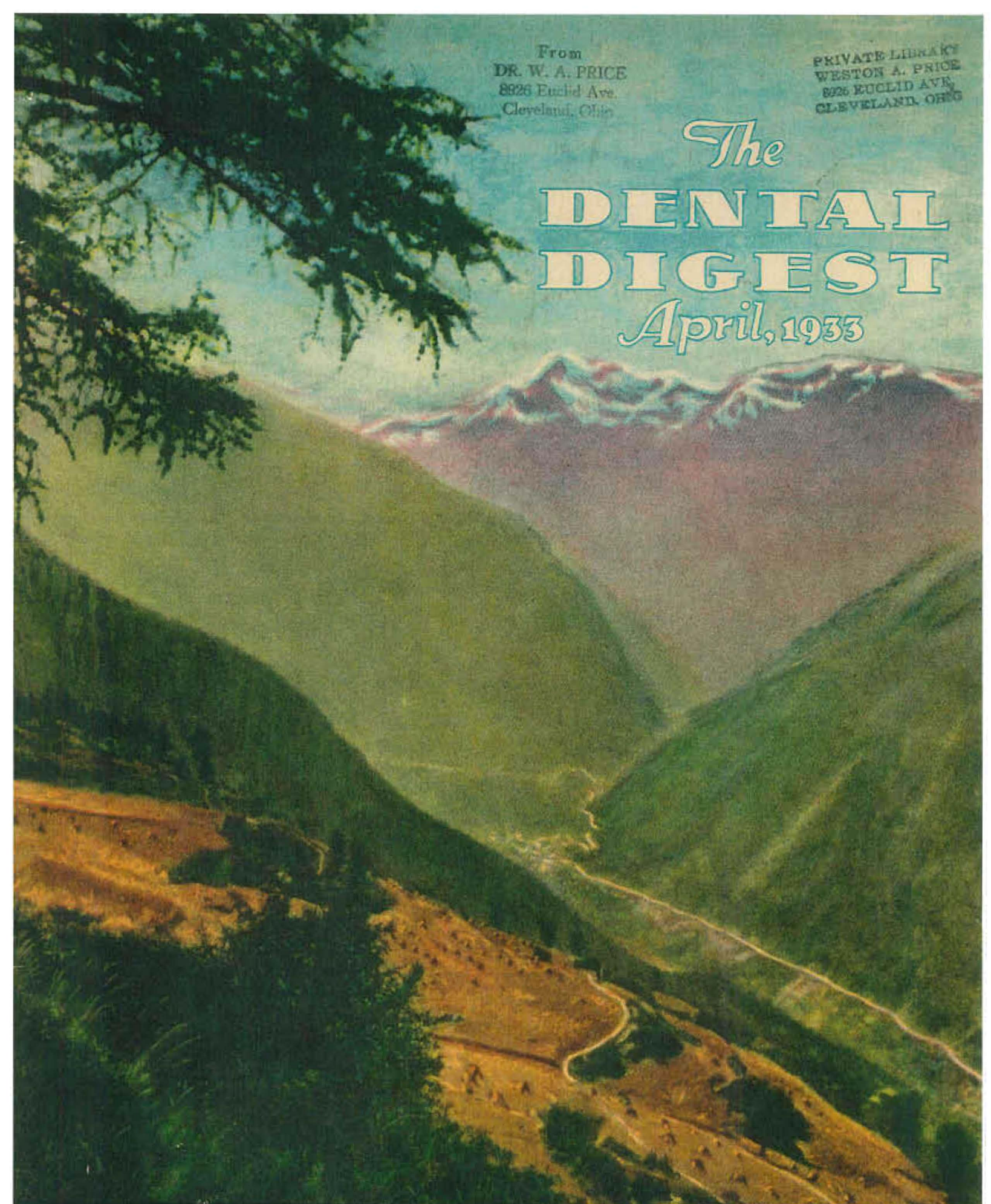


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Visperterminen's Garden in the Sky in beautiful Loetschental Valley, Switzerland. The inhabitants' isolation from modern foods gives them almost complete immunity to tooth decay

Continuing: WHY DENTAL CARIES WITH MODERN CIVILIZATIONS
By Weston A. Price, D.D.S., M.S., F.A.C.D.

WHY DENTAL CARIES WITH MODERN CIVILIZATIONS?*

II. FIELD STUDIES IN PRIMITIVE VALAIS (WALLIS) DISTRICTS, SWITZERLAND

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SINCE physical isolation provides practically the only condition for compelling human beings to live on natural foods, one logically thinks of the rugged country in southern Switzerland as furnishing a variety of settlements in which Nature has been able to fondle her children undisturbed by modern civilization. In the summer of 1931 I succeeded in locating and visiting a group of people living in protected isolation in the Loetschental valley, and it seemed important to extend these studies to other districts to ascertain whether similar conditions would be found. Consequently in 1932 I returned to Switzerland to examine further the people in the Loetschental valley and to obtain detailed data on individual physical characteristics and dental conditions. For this purpose samples of saliva were obtained for chemical analysis and for estimating the levels of immunity on this basis. In the March issue of *THE DENTAL DIGEST* I have presented general information regarding the Loetschental valley.

I inquired of many persons regarding the most favorable districts in which to make further search to find groups of people living in protected isolation because of their physical environment, and decided to study some special high alpine watersheds between the Rhone valley and Italy. The Canton of Wallis (Valais) is bordered on the west by French speaking people, Italian speaking people on the south, and German speaking on the east and north. I was fortunate again in having the assistance of Mrs. Price in studying these people. I had as guides and interpreters in Wallis Doctor Adolf Roos for part of the territory and Doctor Alfred Gysi for all of this territory. Since alpine mountain climbing has been one of Doctor Gysi's hobbies throughout his life he has an encyclopedic knowledge of alpine flora and he makes a charm-

*These reports are complementary to a detailed study to be published in book form which will deal with the etiology and control of dental caries and associated degenerations.

ing traveling companion. Our first expedition was into the valley of the Visp which is a great gorge extending southward from the Rhone River dividing into two gorges, one going to the Saas Fee country and the other to the vicinity of the Matterhorn with its almost spirelike pinnacle lifting itself above the surrounding snow-capped mountains and visible from eminences in all directions as one of the mightiest and most sublime spectacles in the world. It was one of the last mountains of Europe to be scaled by man. One has not seen the full majesty of the Alps if he has not seen the Matterhorn.

We left the mountain railroad, which makes many of the grades with the cog system, at the town of St. Nicholas and climbed the mountain trail to an isolated settlement, on the east bank of the Mattervisp River, called Grachen, a five hour journey. The settlement is snuggled on a shelf high above the east side of the river where it is exposed to southern sunshine and enjoys a unique isolation because of its physical inaccessibility. An examination made of the children in this community showed that only 2.3 teeth out of every hundred had been attacked by tooth decay.

The hardihood of the people is splendidly illustrated in Fig. 7 which shows a woman of 62 years carrying an enormous load of rye on her back. We met her later and talked to her and found that she was extraordinarily well developed and well preserved. She showed us her lovely grandchildren who had fine physiques and facial development.

The rye is so precious that the heads are protected while being carried by wrapping them in a large canvas so that not a kernel will be lost. The rye is thrashed by hand and ground in stone mills which were formerly hand-turned like the one shown in Fig. 3. Recently water turbines have been installed. Water power is abundant. The grinding is done for the people of the mountain

side in these water-driven mills. Only whole rye flour is available. Each household takes turns in using the community bake oven which is shown in Fig. 4. A month's supply of entire rye bread is baked at a time for one family.

Here again the cows were away in the midsummer, pasturing up near the glaciers. Grachen has an altitude of about 5000 feet. The church at Grachen was built several hundred years ago. We were shown an embossed certificate of honor and privilege extended to a group of about 120 people who had originally built the edifice. We were given valued assistance by the local priest and facilities in his spacious and well kept rooms for making our studies of the children.

From Grachen we returned to St. Nicholas and proceeded down the valley by train for another steep ascent of several hours to the hamlet of Visperterminen on the east side of the mountain above the Visp River, below the junction of the Mattervisp and Saaservisp. This community is composed of about 1600 people living on a sheltered shelf high above the river valley. The view from this position is indescribably beautiful. It is a little below the timber line of this and the surrounding mountains. Majestic snow-clad peaks and precipitous mountains dot the horizon and shade off into winding gorges which mark the course of wandering streams several thousand feet below our vantage point. It is a place to stop and ponder as is suggested by Fig. 5. Doctor Gysi's friends will recognize him in the picture.

It is impossible for photographs adequately to reveal the physical relationship of these two communities. In Fig. 7 the patches of rye standing in shocks are about 3000 feet above the river and roadway shown in the winding ravine. The snow-capped mountains in the distance are from fifty to a hundred miles away. The gradations in climate range in the

summer from a tropical temperature in protected nooks in the daytime to sub-zero weather with raging blizzards at night on the high mountains. It is a place where human stamina can be tempered to meet all the vicissitudes of life.

The village consists of a group of characteristically designed Swiss chalets clustered in a nook on the mountain side. The church stands out as a beacon visible from mountains in all directions. Visperterminen is unique in many respects. Notwithstanding its relative proximity to civilization which is only a few hours journey from the thoroughfare of the Rhone valley, it has enjoyed isolation and opportunity for maintaining its characteristic primitive social and civil life. We were greeted here by the President of the village who graciously opened the school house and sent messengers to have the children of the community promptly come to the school building in order that we might make such studies as we desired. This study included a physical examination of the teeth and of the general development of the children, the making of photographic records, obtaining saliva samples, as in each of the other places, and also, a detailed study of the nutrition. We also obtained foods for chemical analysis.

The people of Visperterminen have the unique distinction of owning land in the lower part of the mountain on which they maintain vineyards to supply wine for this community. They have the highest vineyards of Europe, which are grown on banks that are often so steep that one wonders how the tillers of the soil or the gatherers of the fruit can maintain their hold on the precarious and shifting footing. Each terrace has a trench near its lower retaining wall to catch the soil that is washed down each year and this soil must be carried back in baskets to the upper boundary of the plot. This is all done by human power. The vineyards afforded them such additional nutrition as would be furnished by wine and the fruit minerals and vitamins which the two previous groups we studied at Loetschental and Grachen did not have the privilege to obtain.

This additional nutrition had particular interest and importance because of the opportunity for obtaining vitamin C which has been thought by some authorities to be of special importance both for the prevention of dental caries and for the health of the gums. It is of particular interest in the study of the incidence of tooth

decay in Visperterminen where these additional factors were made available by the wine that these additions had not provided a higher immunity to tooth decay nor had they provided a better condition of health for gingival tissues than previously found. In each one hundred teeth examined there were 5.2 found to have been attacked at some time with dental caries. Here again the nutrition consisted of rye almost exclusively as the cereal and of dairy products, with meat about once a week. Limited green foods were had during the summer. The general custom is to have a sheep dressed and distributed to a group of families thus providing each family with a ration of meat for one day a week, usually Sunday. The bones and scraps are utilized for making soups to be used during the week. The children have goat's milk in the summer when the cows are away in the higher pastures near the snow line. Certain members of the families go to the higher pastures with the cows and make cheese for the coming winter's use.

The important part played by the goat and the high esteem in which it is held by the people is interesting. This is indicated in Fig. 6. The goats go out to the pasture in the early morning at the break of day after they have been milked. The flocks of the village are shepherded by one or two boys. Each family takes turns at shepherding the flocks for a day. The boys are not alone for they are with their intimate friends, the goats. They see a different moving picture every day in the changing moods of the monarch peaks as they are kissed from time to time by the drifting billowy clouds. This is the school in which poets are made and symphonies conceived. In the twilight of the evening after the sun has set and the shadows are deepening the bells of the goats will be heard tinkling down the mountain side as they are driven homeward by the whistling and caroling young herders. As they arrive the children of the village rush out to meet them and find the pets of their home and lovingly throw their arms about the goats' necks. The greeting is one of affection on the part of the goats apparently as well as of the children. The goats are then corralled into a large room constituting the first floor of a building in which the two hundred goats are crowded apparently so close together that they cannot lie down.

It is now dusk and someone from each household comes to milk the goats. It is a beautiful sight and one

long to be remembered to see the way in which each goat is selected from the dark enclosure by simply having its name called by the member of the household, usually the mother, who is to do the milking. The goat answers to its name with an affectionate bleat and immediately struggles to reach the gate to get out to be milked. Often there is so great a pressure about the door that it is impossible for the goat to reach the exit, whereupon it gives a cry of trouble. Frequently it is necessary in assisting the goat literally to drag it by the horns over the backs of the others to the outdoors where it is led to a delicious morsel of some plant or other food which it eats with evident relish while being milked. After this the goat is put back into the corral until morning. Truly these goats perform a beneficial mission in that they act as transformers for carrying the activators built by sunshine into the foods for the boys and girls, thus providing the battery power which makes it possible for them to utilize the fuel that is so abundantly supplied to them in their rye bread and dairy products.

It will at once be seen that the problem of identifying these goats or the cattle for establishing individual ownership would be a considerable one where the stock of all are pastured in common herds. It was interesting to us to observe how this problem was met. The President of the village has what is called a tessel which is a string of manikins in imitation of goats or cattle made of wood and leather. Every stock owner must provide a manikin to be left in the safe keeping of the President of the village with whom it is registered. It carries on it the individual markings that this member of the colony agrees to put on every member of his animal stock. The marking may be a hole punched in the left ear or a slit in the right ear or any combination of such brandings as is desired. Thereafter all animals carrying that brand are the property of the person who registered that mark; similarly any animals that do not have this individual brand cannot be claimed by him. This sacred instrument of ownership is carefully guarded.

As one stands in profound admiration before the stalwart physical development and high moral character of these sturdy mountaineers he cannot but be impressed by the superior type of manhood, womanhood, and childhood that Nature has been able to produce when given a suitable diet and suitable environment. Surely here



Fig. 1



Fig. 2

Figs. 1 and 2—The goats are the route of the minerals to many of the dwellers in the high Alps whose teeth do not decay. They collect the activators into which the plants transform the radiant energy.

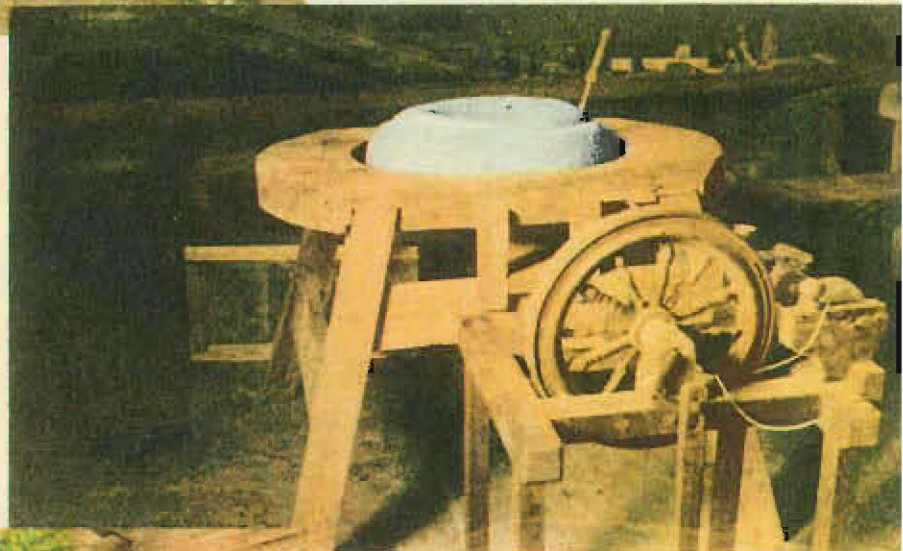


Fig. 3—A primitive hand mill for home use. Larger types are run by water power.

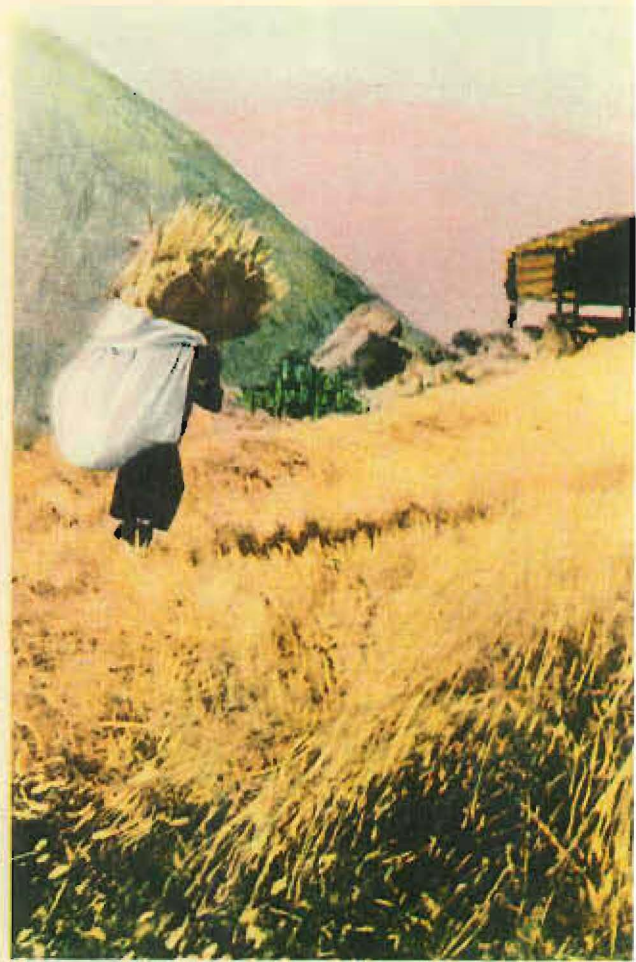
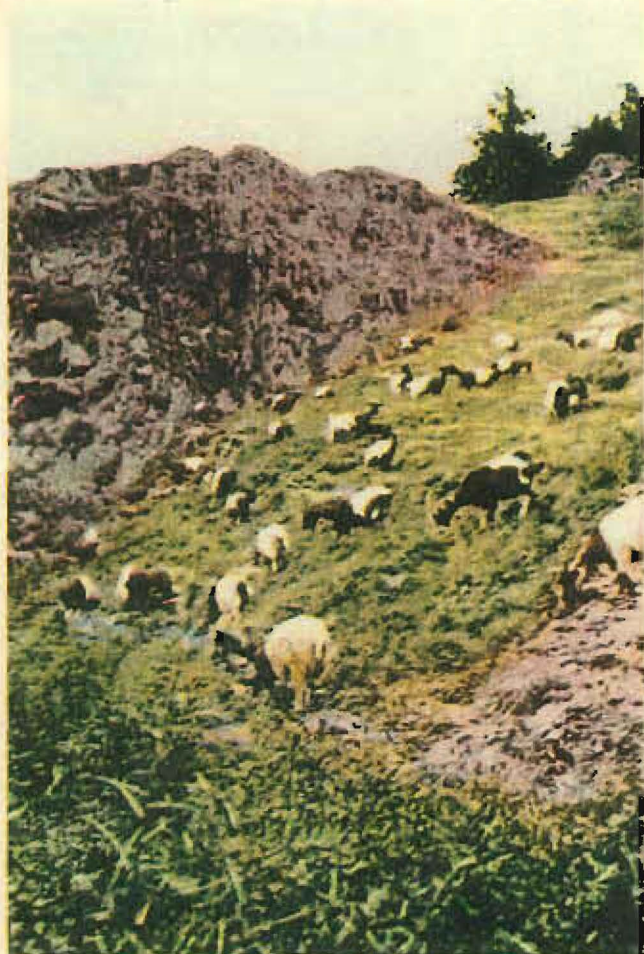
Fig. 3



Fig. 4—Community bake oven.



Fig. 5—View from Visperterminen.



Figs. 6 and 7—The route of the minerals and grain activators from the soil to bread in the high Alps.
Fig. 6—The goats feeding; Fig. 7—Harvesting the rye.



Fig. 8—The grist mill at Visperterminen for producing entire rye flour and meal

is evidence enough to answer the question whether cereals should be avoided because they produce acids in the system which if formed will be the cause of tooth decay and many other ills including the acidity of the blood or saliva. Surely the ultimate control will be found in Nature's laboratory where man has not yet been able to meddle sufficiently with Nature's nutritional program to blight humanity with abnormal and synthetic nutrition. When one has watched for days the gamboling child-life in those high alpine preserves of superior manhood and when one has contrasted them with the pinched and sallow and even deformed faces and distorted bodies that are produced by our modern civilization and its menus, and when one has contrasted the unsurpassed beauty of the faces of these children developed on Nature's primitive foods with the varied assortment of civilization's children with defective facial development, he finds himself filled with an earnest desire to see that this betterment is made available for modern civilization. It only requires a few hours journey from one of these human preserves of Nature to reach the highways of the ever-expanding industrial world to see the tragedy that can be wrought in these same people in an incredibly short time.

Over and over we had the experience of examining a young man or young woman and finding that at some period of his life caries had been rampant and had suddenly ceased, but during the stress many teeth had been lost. When we would ask such people if they had gone out of the mountain and at what age, they would generally say at 18 or 20 years of age they went down to this or that city and stayed a year or two. They stated

they had never had a decayed tooth before they went or since they returned but had lost some teeth in the short period away from home.

At this point of our studies Doctor Roos found it necessary to return to his family but Doctor Gysi accompanied us to the Anniviers valley which is also on the south side of the Rhone. The river of the valley, the Navizenze, drains from the high Swiss and Italian borders north to the Rhone River. Here again we had the remarkable experience of finding communities near to each other, one with high immunity to tooth decay and another with rampant tooth decay.

The village of Ayer lies in a beautiful valley well up toward the glaciers. It is still largely primitive although there has recently developed a government road which like many of the new arteries has made it possible to dispatch military protection when and if necessary to any community. In this beautiful hamlet until recently isolated we found a high immunity to dental caries in which only 2.3 of each hundred children's teeth examined were found ever to have been attacked by tooth decay. Here again the people were living on rye and dairy products. We wonder if history will repeat itself in the next few years and that there too this enviable immunity will be lost with the advent of the highway. It usually does not take long after tunnels and roads are built to allow automobiles or even wagons to enter with modern foods and for these foods to do their destructive work. This is tragically demonstrated in this valley since a roadway was extended as far as Vissoie several years ago, and in this village modern foods have for some time been available. One could probably walk the distance from Ayer to

Vissoie in an hour. The number of teeth found to be attacked with caries for each one hundred children's teeth examined at Vissoie was 20.2 as compared with 2.3 at Ayer. We had there a splendid opportunity to study the changes that had occurred in the nutritional program. With the coming of means for transportation and new markets there had been shipped in modern white flour, equipment for a bakery to make white flour goods, highly sweetened fruit, such as jams, marmalades, jellies, sugar and syrups—all to be traded for the locally produced high vitamin dairy products and high mineral cheese and rye, and with the exchange there would be enough money as premium to permit buying machine made clothing and various novelties that will soon be translated into necessities.

Each valley or village has its own special feast days on which athletic contests are the principal order of events. In the Loetschental valley, the report of the study of which appeared in the March issue of *THE DENTAL DIGEST*, the feasting through the past has been largely on dairy products. The athletes were provided with large bowls of cream as constituting one of the most popular and healthful beverages, and special cheese was always available. Practically no wine was used because no grapes would grow in that valley and for centuries their isolation prevented them from having access to much material that would provide wine. In the Visperterminen community, however, the special vineyards owned by these people on the lower level of the mountain side provided grape juice in various forms of fermentation, and for them their feasts in the past have been celebrated by the use of wines of rare vintage as well as with cream and other dairy products. Their cream products took the place of our modern ice cream. It was a matter of deep interest to have the President of Visperterminen show us the tankards that had been in use in that community for nine or ten centuries. The care of these was one of the many responsibilities of the chief executive of the hamlet.

We are deeply interested in the story the cemeteries can tell. It is reported that practically all skulls that are exhumed in the Rhone valley, and indeed practically throughout all of Switzerland where graves have existed for more than a hundred years, show relatively perfect teeth; whereas all burials in those communities of recent date were of people with teeth that had been riddled with caries or had been lost because of caries. It is

of interest that each church generally has associated with it a cemetery in which the graves are kept decorated, often with beautiful designs of fresh and artificial flowers. Members of succeeding generations of families are said to be buried one above the other to a depth of many feet. Then after a sufficient number of generations have been so honored their bodies are exhumed to make a place for present and coming generations. These skeletons are usually preserved with honor and deference. The bones are stacked in basements of certain buildings of the church edifice with the skulls facing outward. These often constitute a solid wall of considerable extent. In Naters there is such a group said to contain 20,000 skeletons and skulls. These were studied with great interest as was also a smaller collection in connection with the cathedral at Visp. While many of the single straight rooted teeth had been lost in the

handling many of the teeth were present. It was a matter of great interest and importance to find that only a small percentage of teeth had had caries. Teeth that had been attacked with deep caries would have developed apical abscess and consequent destruction of the alveolar process. Evidence of this bone change would be readily visible if the teeth were lost from their sockets during the handling of the dry skeleton. These sockets still had their lamina dura continuous, indicating that the teeth had been vital at death.

It must be kept in mind that the purpose of these studies is to determine the cause of these changes in physical well-being of the people living in these different communities so closely associated. An important part of this consideration has to do with the food that is eaten. We can with safety assume that the present diet of these isolated groups is in general

similar to, if not identical with, that of the entire district a relatively few decades ago. In the fifth of this series we will study the chemical and activator content of the primitive diets together with the chemical and activator content of the foods of nearby modernized communities in order that we may ascertain the fundamental changes that occurred in their nutrition.

(End of Second Installment)

COMING:

- III. Field Studies in Modernized St. Moritz and Herisau, Switzerland.
- IV. Field Studies in Primitive and in Modern Outer Hebrides, Scotland.
- V. Practical Procedures for the Nutritional Control of Dental Caries.

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