General Manager S. Maus Purple inspecting prehistoric teeth, tusks, bones and shells 500 thousand years old. Holding cannon bone of five-toed prehistoirc horse.

TORRANCE LIME & FERTILIZER CO. HEARTILY COMMENDED BY PROF. BAILEY

(Continued From Page 1)

ed, faulted, forming the Coast Ranges.

The Monterey rocks were intruded by the diabase found near the summit of the San Pedro Hills. At Long Point the sandstones and shales are traversed by numerous small dikes of eruptive rock.

A Fault enters the coast about 1½ miles northwest of Point Firmin and has a strike of north 50 deg. west. Numerous small faults are seen wherever there are rock outcrops.

(6) Depression—San Diego Formation—The sediments of this formation were laid down in waters about 100 fathoms deep. The sediments have been elevated since, deformed, eroded, and again submerged so that there is only a remnant left. These red, yellow and brown sands can be seen at Timms Point and Deadman's Island overlying the Monterey.

(7) Elevation — Sierra Epoch—With the opening of the Pleistocene period the mighty Sierras were rejuvinated and had summits that towered 20,000 feet above sea level. The Coast Range partook in a less degree of this uplift. The San Pedro Hill probably was about 2500 feet high then.

The great height of the Sierras brought glaciers. The glyacial age is divided in three parts: . The first glaciers. 2. The inter-glacial time when mankind and the Rancho La Brea animals appeared. 3. The last glacial age. Today we are living with the last glaciers, for California has still a number of living small glaciers.

(8) Depression—San Pedro Epoch—Named by W. H. Dall, 1898—The Coast Ranges stood from 300 to 700 feet lower than they do today, and the ocean encroached the edges of the land.

The then existing valleys were filled with gravel, and the plains were covered with sands and other sediments building land like the Moneta-Downey Plains.

The San Pedro Epoch is divided into two very different parts—Upper San Pedro formation, or "Cerritos Beds," consisting of unconsolidated sandstone or indurated sands, generally of a yellow color, and penetrated by roots. These occur along the boulevards from Wilmington tc San Pedro, and form the hills of the latter city. The thickness is about 100 feet and the sediments were laid down in about 50 fathoms of water, as shown by the shell life. The abundant shell life is recent and is a warm water fauna that is characteristic of California.

The Lower San Pedro Formation or the "Deadman's Island Beds," has a cold water fauna, or Arctic fauna similar to that of Japan, showing a change in the great Japanese current—the Kuro Siwo—the sweeps down from the north, while the depth of water was still about 50 fathoms.

These sediments lie on the flanks of the eastern edge of the hills, sweeping around the north edge to beyond the D. M. S. & B. "Marl Pits."

This formation may be seen near Timms Point, resting on the San Diego formation and at Deadman's Island. At the Island it is filled with the little Feraninifera, as well as large fossils. The D. M. S. & B. Marl Pits of the Torrance Lime and Fertilizer Company belong to this formation.

(9) Elevation—Terrace Epoch—The Terraces are not all of the same age. The higher ones are much older than the lower ones, and probably date back at least to inter-glacied times.

The increased elevation caused the cutting of new gullies and the scouring of the channels filled during the San Pedro Epoch.

That the Terraces are wave-cut is evident, as marine gravels are laid flat on top of the older topography, while the underlying sand and marls having a sharp dip are truncated at the top, making a sharp unconformity. Each Terrace marks the height of the hills above the sea at that time.

The old forms of the Terraces have been modified by gullies cut into them, the streams forming little canyons.

(10) Some of the lower Terraces are as old as the oldest relics of mankind. The primitive Indians camped on them and hunted their sea-food at the shore close at hand. This is shown by the piles of old refuse or mounds of seashells that the savages made, or Kitchen Middens, as they are known to historians. They seemed to be especially fond of Pectens, Haliotis and Chione, for we find these shells mixed with pieces of charcoal, arrow heads, flint chips and animal remains.

(11) From the time of the primitive Indians to the discovery of California by the Spaniards we have no records. They are lost in the fogs and mists of legends and traditions.

THE D. M. S. & B. MARL PITS

The D. M. S. & B. Marl Pits of the Torrance Lime and Fertilizer Company are of great interest to scientists. The big blasts at the quarry bring down bones of whales, sea lions, land animals, chiped flints, bits of charcoal, sea shells, sharks' teeth, arrowheads, all mingled together.

A section at the Marl Pits shows the following:

1. Top—the level top of one of the lower terraces, or the second major terrace, is covered with a thin soil. The ground is so flat that the soil is easily removed by plowing and scraping.

2. Immediately below the soil is a thick, dark band of several feet of Marine gravels, which was the beach when the base of the hill was lower and at sea level.

3. Below the marine gravels of the terrace are the white marls of the Lower San Pedro Formation or Deadman's Island Beds.

The marl beds do not lie flat, but dip sharply, making a sharp unconformity with the terrace gravels and showing clearly that the marl beds have been truncated by the waves.

Marl is a term applied in America to incoherent sands and fragments of shells. At the D. M. S. & B. pits this marl consists almost entirely of mases of shells lightly cemented together by the lime and organic matter of the mollusks that once lived in the shells.

This light cementing gives the marls a granular structure that greatly increases its value as a fertilizer. It differs from the formation at Deadman's Island, where the Lower San Pedro consists of cemented and incoherent sandstones of a gray color, and containing an abundance of seashells. At the D. M. S. Pits the marls are white, or white tinged with yellow, and the lime of the seashells makes up the mass, while there is very little silica.

A section of the pits show a number of faults of different ages, among them a clear series of "step faults."

A Remarkable Resemblance—"Crag" is an English term for "a fossiliferous sandy marl of marine origin."

In England there are found the Pleistocene "Forest Beds" that are estuarian, and the gravels contain elephant bones (Elephas meridionalis). Below this are the marine "Norwich Crag," with mammal bones (whales) and a cold water sea-life, while the crags or marls contain phosphates. The "Astian" formation of Italy is similar.

This close correspondence with the conditions at the D. M. S. & B. Pits point to a world-wide similarity of conditions (according to the latitude) at that time of the Pleistocene.

FOSSILS.—At the time this is written—November, 1921—the work of identifying the fossils is going on. They arrange themselves in the following natural order:

1. Top—Kitchen Middens—Rude heaps of large sea shells made by aborigines, fragments of charcoal, arrowheads, flint chips, cut bones, animal bones.

2. Land animals of the Terrace Formation.

3. Sea Fauna of the Lower San Pedro Formation, bones of whales, sea lions, sharks' teeth, sea shells.

ORIGIN.—The sea-life is more local than land life, especially those forms that had little or no freedom of movement like the mollusks. The primary thing that controls the abundance of shells in each locality is the food supply. Most bivalves are fixed and must meet and satisfy the conditions of their immediate environment or they cannot survive.

Each zone or depth of the ocean has its own special type of life, just as successive altitudes on a mountain have.

From a study of the sea life it seems that these D. M. S. marls at one time formed a white shell-ooze at the bottom of the ocean at a depth of about 50 fathoms; that the abundant food supply for the myriad forms of sea life was brought down by a stream that entered the ocean at a point nearby. Such a stream would account also for the carcasses of land animals carried into the ocean and finding rest in this ooze.

FINALY—These "Notes" have been written as a brief outline of the life history of San Pedro Hill. Such an outline, like an architect's sketch plan, is subject to modification in the details as more facts are gathered. When the full history of the D. M. S. & B. Hills is written it will add greatly to knowledge of the past, and will be of great aid in solving the design, intent and purpose of this old, old earth of ours.

I think that the action of the

WONDER WORKING POWER!

They Liked It So Well They Wrote Poems About It

Tune: Rock of Ages

In the Rock of Ages past
Has come to our ken, at last,
Knowledge of a long past day,
E'er Time had grown old and gray,
E'er man had his life unfurled
In this then new-formed old world.
And of those who in that day
Lived and strove and passed away.

Dear Marine's Sarcophagus
And bones of those gone to dust,
Is the greatest substance known
On the footstool of God's Throne,
To make vegetation grow
It is the Active Radio,
For it radiates a force—
Time has stored up in its course.

This force, which is stored in Lime,
Makes all vegetation climb,
With an energy sublime,
Not before known in our time.
In an effort to attain
On our modern fair earth plain,
Sizes of things gone before,
Which are now on earth no more.

These lives left this present age,
What they wrought in their life stage,
Sealed up in the solid "Rock"
That old Time could not unlock,
But man has obtained the key
Of this hidden mystery,
Ope'd the "Rock" so long unknown,
And its secrets made his own.

Now, this mystery unsealed
Has its hidden life revealed,
'Til that life, which was of yore,
Lost on dark oblivion's shore,
And the power with which it wrought
Into modern hands is brought,
To be used once more again
For our pleasure or our—pain.

In the Book of Life they wrought
We now read with awestruck thought,
Of those creatures of the past,
Living, striving and at last,
Sinking into death's embrace,
Each in its appointed place.
Which the relics in their tomb
Tell of their life and their doom.

And we wonder if our lives,
With their conquests and their strifes,
And their lack of kindly deeds,
For relief of kindly needs,
Make their records in the stone
That will in times now unknown
Be read by a future race
That shall occupy our space?

W. R. WOODARD,
Sea Bright, Cal.

LIME MAKES US HEALTHY

"Rock Products," December 3, 1921.—Lime makes us healthy and efficient. Notable physical and mental development of the peoples of the earth, says the Physical Culture Magazine, is due to food that supplies much lime; that tuberculosis and other diseases are combatted and the functioning of the body muscles is favored by lime. Modern tendencies have so refined foods—taken the hull from rice, bran from bread, etc.—that we are robbed of nutriments.

——D. M. S. & B.——

LIME DUST AND TUBERCULOSIS

Has lime and limestone dust a beneficial effect on tuberculosis sufferers? "Rock Products" believes the subject worth a thorough investigation. During the past few weeks the editors have made quite a canvass of the industry for the experience of the various producers. A surprising amount of interest has been displayed and a valuable amount of data accumulated.

ROBERT S. SHAW,

Dean and Director Agricultural College and Experiment Station.

Robert S. Shaw, Dean Michigan Agricultural College and Director Michigan Agricultural Experiment Station, East Lansing, Mich., says:

"Leguminous crop, such as the clovers, alfalfa, soy beans, cow peas, etc., are a great aid to the farmer in maintaining soil fertility and also in producing other farm crops in abundance. As lime corrects unsuitable soil conditions for the growth of legumes and stimulates them, it is therefore of great value to the American farmer when properly used."

TORRANCE LIME AND FERTILIZER COMPANY should be an example to all companies that are engaged in developing the raw material resources of California, THE GEOLOGIC WONDERLAND OF THE WORLD. The day of secrecy is past. Advertisers are taking the public into their confidence and winning friends thereby. These D. M. S. marl deposits is not a mere lime quarry to be worked for private profit, but deposits that reveal clearly important facts in the world's pas history.

To obliterate them would be a crime. To take pains to preserve them is a duty. Men will come from England, Belgium, Italy and other countries to study the D. M. S. deposits, because they throw light on the "Crags" of their own country. They have the famous Rancho la Brea fossils, the D. M. S. & B. Marls and Fossils, the oldest trilobites at Waucoba Springs, and hosts of other wonders all within 100 miles of Los Angeles. Why not make this region the Geologic Mecca of the world?

NOTICE !

Historians! Geologists! Scientists! Permission is herewith granted to use the above in part or whole, providing acknowledgement source is given.

Profitable investment is not gambling, nor is the result dependent upon luck. Price is what you pay. Value is what you receive.

D. M. S. is ten jumps ahead for better soils.

LIME FOR CITRUS TREES

The Covina Argus of October 15, 1910, has this to say on the subject:

"From reliable resources we find that Covina has 1000 acres of trees in bearing that are not producing one box to the tree on an average. This is not guess work. These are facts." And suggests that Covina was no worse off in this respect than other citrus districts.

The deficiency of available lime in the orchard soils was discovered to be an adequate cause for the decline of the groves. Now, the groves are generally thrifty and little is heard of mottel-leaf or general decadence of the groves. Mottle-leaf has long been recognized as due, among other causes, to a shortage of nitrogen, yet lime has cured most of it by enabling the trees to make use of the nitrogen already present or being supplied. Had lime and organic matter been adequately provided for the trees in the nitrate plot the results would doubtless have been very different from what they are.

No new plant cells can be produced without lime. Therefore, growth and fruitage were checked when the supply of available lime, naturally low in this soil, became practically exhausted.

The use of nitrogen by the trees is restricted by lack of lime, hence the trees failed for lack of nitrogen, even in the presence of abundance of this element, just as Hilgard pointed out that plants suffer from drouth even when growing in the wettest soils when factors are present preventing the absorption of the water.

(After R. R Snowden, Agricultural Chemist.)

——D. M. S. & B.——

ORANGE TREES

With reference to the gypsum applications, it must be said that these are useful in small quantities to neutralize any black alkali. There is only one other use of gypsum of great moment, and that is in the loosening of heavy clay soils which need improvement in texture. For such purposes the gypsum should be applied at the same time that the lime is applied, and where lime alone can be employed for the above purposes it should be given the preference.

(After William S. Myers, D.Sc., F.C.S., Director.)

——D. M. S. & B.——

LIMESTONE IN ILLINOIS

F. C BAUER, Agronomist, Illinois Experiment Station

At request of Dr. Eugent Davenport, Dean of the Illinois College of Agriculture and Director of the Illinois Agricultural Experiment Station, Professor F. C. Bauer makes the following statement, reference need of agricultural limestone on Illinois soils:

"Limestone is indispensable to permanent and profitable agriculture in Illinois. We have 20,000,000 acres of acid soil in this State. We need 10,000,000 tons of Limestone annually. In southern third of Illinois are 10,000,000 acres on which Limestone is absolutely essential. Neither successful grain nor live stock farming can be carried on without it.

"Nothing can take its place. These soils alone need 50,000,000 tons of Limestone to start with and 5,000,000 tons annually to maintain production.

"As an average of many tests on ten experiment fields in as many counties in Southern Illinois over periods of five to sixteen years, one ton of Limestone produced 12 bushels of corn, 11 bushels of oats, 11 bushels of wheat and a half ton of hay, or 5 bushels of soy beans. In the corn belt, where need of Limestone is not so imperative, field experiments show that a ton of Limestone in four-year rotation produced 4 bushels of corn, 5 bushels of oats, one-fourth ton of colver and 2 bushels of wheat.

"So satisfactory have been results obtained from Limestone in Illinois that its use has increased to several hundred thousands of tons per year. The chief problem now is that of keeping the supply up with the demand."

D. M. S. is economy plant food.

——D. M. S. & B.——

ACTUAL ANALYSIS

Los Angeles, Cal.
December 24, 1921.

Acid Insoluable (including Potash)	10.20%
Total Water	2.20%
Iron & Alumina Oxides Fe2O3 & A12O3)	6.98%
Calcium Oxide (CaO)	41.12%
Sulfur Trioxide (SO3)	0.33%
Magnesium Oxide (MgO)	1.38%
Free Sulfur	Trace Only
Organic Matter	3.91%
Phosphoric Oxide (P2O3)	4.48%
Carbon Dioxide (CO2)	29.39%
Total Potash (K2O)	0.28%

Synthetic Form of Above

Acid Insoluable (Including Potash)	10.20%
Total Water	2.20%
Iron & Alumina Oxides (Fe2O3 & A12O3)	6.98%
Calcium Sulfate CaSO4)	0.64%
Gypsum Equivalent	0.88%
Calcium Phosphate (Ca3(PO4)2)	9.79%
Calcium Carbonate (CaCO3)	63.45%
Magnesium Carbonate (MgCO3)	2.88%
Potassium Silicate (K2SiO3)	0.46%
Organic Matter	3.91%
Free Sulfur	Trace Only

GEO. W. GOOCH,
Analytical Chemist.

Let the new day in agricultural prosperity dawn in your ranch—your own yard.

D. M. S. is agricultural permancy.

View of very small portion of the D. M. S. deposit where prehistoric water and land mammels fought and played on the shores of the Pacific previous to man's existance; also where Prof. Bailey made his geologic determinations.

DAVID STARR JORDAN

Stanford University of California

October 13, 1921.

Mr. S. Maus Purple,
301 Bradbury Building,
Los Angeles, Cal.,
Dear Mr. Purple:

I have gone over the things you sent with some care. It is a most extraordinary mixture of land and seastuff and only a geologist on the spot can tell how it came about. A few shells are from deep water—the rest from the shore.

The mammal bones seem to be fragments of whales, partly of beasts, which I cannot place, the sea lions perhaps. And these are in various conditions—some wholly petrified, others just plain bones. The latter probably came from Indian camps of much later date.

There are three species of Carcharodon, the Great White Shark. One is Carcharodon reversi, the small one with saw-edged teeth, the thick one is Carcharodon branneri, the big one is new to Science. This, if possible, I want you to send both sepecimens to me, for the United States National Museum. I want all the shark teeth if possible.

I enclose the list of the shells and teeth. Those I mark ‖ I would like to have you return if you are willing as they are rare in collections. I ask you not to grind up any shark's teeth, or other teeth, or any of the sea-snails as these have great scientific values.

All these belong to the Lower Pleistocene formation, about as old as the earliest relics of man, perhaps, 100,000 to 150,000 years ago. A few bones and teeth seem to belong to Kitchenmidden or old Indian Camps.

Since dictating the above, I have received the little box of teeth. The largest with saw edges seem to belong to the living Man-eater or White Shark, (Carcharodon Carcharias), occasionally taken off our coast. As this reaches a length of 35 feet, with teeth 1¼ inches long, the great Carcharodon must reach 120 feet.

The smooth-edged teeth are Isurus, apparently the species now living on the coast, Isurus Glaucus. The little tooth and the bird bone I do not recognize. The tooth looks like a sealion pup.

Very truly yours,
DAVID STARR JORDAN.

——D. M. S. & B.——

D. M. S. for better crops, better permanent fertility.

C. G. WOODBURY

Ex-Director Experiment Station.

C. G. Woodbury, Ex-Director Agricultural Experiment Station, Purdue University, Lafayette, Indiana, says:

"Many of our soils have through years of cropping become depleted in organic matter and in nitrogen content. To recover these losses and improve the crop producing power of our soils more clover is a prime essential. On much of Indiana soil lime is the key to successful clover production.

"The investigations reported in Purdue Bulletin 213 show that on seven experiment fields in different parts of the State ground limestone has produced crop increases worth from $10.50 to $67.70 per acre per rotation of corn, wheat and clover. The average net profit has been $6.78 per acre per year and $2.68 per dollar invested."

——D. M. S. & B.——

JOE WING

Ohio Alfalfa King and Successful Farmer, Associate Editor of Breeders' Gazette.

Joseph E. Wing (Deceased) said:

"Carbonate of lime is the sort that Go d put i nthe soil when He made it. Burned lime is man's attempt at improvement. Burned lime may help and may harm. Carbonate of lime, that is, raw ground limestone, never harms soil. It cannot harm soil. Use it as freely as you like. One could put on 50 tons to the acre and do the soil no injury. It would merely lie in the soil inert till it was required. Carbonate of lime is needed to make the bacteria of alfalfa thrive. It is needed to free the soil from poisons that destroy both bacteria and alfalfa. Carbonate of lime stops waste of fertility, makes vegetable matter into humus, arrests fleeing nitrogen."

SMALL FRUITS AND VEGETABLES

Mr. WM. NOXON, Downey, has used D. M. S. & B. on a part of his place that never grew anything before. Sweet corn, cucumbers, tomatoes, raspberries, melons, apples and peaches were grown on this piece last season, and Mr. Noxon reports averaging $100 per week from the sale of these products in a small fruit stand on the highway.

DAVID STARR JORDAN

Stanford University California

Mr. S. Maus Purple,
301 Bradbury Building,
Los Angeles, Calif.
Dear Mr. Purple:

I will try to get the shells off tomorrow. I have held the shark's teeth to be photographed. I could not let them get away without this ceremony.

I note that you will take me to the deposits whenever I come to Los Angeles. I have asked Dr. J. Z. Gilbert of the high school to represent me at his convenience.

There are two species of large snail of the genus Argobuccinum. Of the one there are four specimens, number 12, which is not the same as number 23, which may be a new species and which our conchologist has taken away in order to compare it with other specimens. It is larger than the four specimens and broken at the top.

I trust that you are not letting any of this valuable stuff be destroyed. Some of the shells, those marked with stars, are unusual and the shark's teeth are unique. Four kinds of maneaters have never been found in a bunch together before.

Very truly yours,
DAVID STARR JORDAN.

CARBON FERTILIZATION AT THE SUNSHINE RANCH

Reprint Part 2, Page 18, Mid-Winter Number Los Angeles Times:

The Sunshine Ranch consists of 4200 acres, located at the foothills of the north side of Los Angeles Valley, four miles west of San Fernando, where soil, climate and water meet in harmony with maximum production every day all the year around. In addition, it has shell lime and other soluble carbon in sufficient quantities for the carbonization of all plant life. On this land cover crops and other diversified production furnish the maximum amount of organic matter rich in soluble carbon, which under proper treatment in combination with the natural elements produces the largest percent of carbon dioxide, poison gas, charged soil and atompshere, so necessary to the breathing tissues of all growing things.

Carbon is the most important constituent of all vegetable matter, and though the deficiency of other vital crop constituents is made good as a matter of course by the farmers when they apply fertilizers, the predominent question of a sufficient carbon supply is left to take care of itself. If nature cannot be trusted to supply nitrogen, potassium and phosphorous in sufficient quanties, why then should it be expected to supply the precise minutely rational supply of carbon which best fosters a luxuriant and healthy growth?

President M. H. Mosier of the Sunshine Company is very enthusiastic over carbon dioxide gas fertilization, and feels that it will be a wonderful thing for increasing the productivity of diversified farming in Southern California. At least, at the Sunshine Ranch, which is one of the show places of California's Southland, every possible advantage is being taken of all the natural elements which combine to render better and continuous production. The ranch is open for inspection to the interested rancher, and Mr. Mosier is never too busy to discuss the wonderful possibilities of cultivation along these lines.

It is hoped by Mr. Mosier that the pioneering work being accomplished at the Sunshine Ranch will be followed very closely by farmers all over Southern California in order that practical demonstration may show what can be done.

Reprint from California Cultivator, December 31, 1921.—R. R. Snowden, Agricultural Chemist, says in part: A plant food is any material which enters the plant body with benefit to the plant. It is a mistake to suppose potassium, phosphorous and nitrogen the only plant food elements, nothwithstanding this has been long the prevailing custom.

ANALYSIS

October 19, 1921.

Total Nitrogen	0.08%
Ammonia Equivalent	0.09%
Total Phosphoric Acid	32.84%
Total Potash (K20)	0.30%

(Signed)
GEO. W. GOOCH,
Analytical Chemist.

July 16, 1921.

Total Phosphoric Acid (P205)	1.58%
Acid Soluble Potash (K20)	0.72%

Respectfully submitted,
SMITH-EMERY CO.,
Chemists and Chemical Engineers.