

Mr. Lippincott's contribution concludes with a brief description of the California Portland Cement Company's works at Colton in this valley, the only Portland cement plant on the Pacific Coast. With abundant crude materials of calspar, clay and almost chemically pure limestone near at hand, and with the Los Angeles petroleum for cheap and excellent fuel, the company is enabled to produce a first-class cement for about three-fourths the price of foreign cements. This is of great consequence for the development of the irrigation interests of the valley.

STORAGE OF WATER ON KINGS RIVER.

KINGS River drains the western slope of the Sierra Nevada in Fresno County, California, from Mount Whitney on the south to Mount Goddard on the north. Fully 80 per cent of the drainage basin is now included within the boundaries of the Sierra Forest Reserve, a matter of prime importance to the irrigated lands below, for it means the conservation of the stream. The river debouches from its mountain drainage basin upon the plains of Fresno, Kings and Tulare counties, sometimes spoken of as the Kings River delta, which are near the geographic center of the State, and present great variety of climate and soil. Fresno and Hanford, the principal towns, are about 200 miles distant from San Francisco and Los Angeles.

Lumber, gold, copper, petroleum, grain, oranges, lemons, many varieties of deciduous fruits, grapes, raisins, wines, and brandies are produced in this region in commercial quantities. There are more than 500,000 deciduous fruit trees in Fresno County. There are about 40,000 acres of vineyards. It is the great raisin district of California. The citrus belt, as is the case in Southern California, is a narrow strip of land at the base of the mountains.

Irrigation is necessary for all varieties of agricultural products, grains possibly excepted. There are about 625 miles of main irrigation canals, covering 380,000 acres of land on the Kings River delta. A good water right adds about \$50 per acre to the value of the valley lands, and about \$90 per acre to the so-called frostless foothill lands, where the citrus fruits, the most valuable crop, could be raised with an increase of the present supply of water, which has been diverted chiefly to the lower lands. The present combined capacity of the Kings River canals is stated to be approximately 4,000 cubic feet per second; in September, 1898, the supply fell to about 145 cubic feet per second. During the last season the profits from the irrigated districts around Fresno were in excess of \$2,000,000. Land without irrigation supply sells here for \$10 per acre; the same land with a good water right sells for about \$60. Hence the importance of the water power development considered in this report, which is on the Middle Fork of Kings River, above all diversions for irrigation or for storage. Kings River can be relied on, in spite of occasional seasons, for a great water supply, draining as it does 1,742 square miles of area from banks of perpetual snow.

In the investigation of the Kings River basin a reconnaissance party under Mr. E. G. Hamilton, Topographer from the United States Geological Survey, reported upon reservoir sites, four of which were then surveyed by a party under Mr. E. H. Green. Of these four sites Mr. Lippincott thinks that two should be utilized, and that storage work should be begun by building the Clark Valley reservoir with an 85-foot dam, and should be followed by the construction of a 140-foot dam at the Pine Flat site.

The Pine Flat site, on the main Kings River, five miles below Trimmer, just above the diversions of all irrigation canals, has an elevation of 600 feet, and the dam would cost \$1,425,600. This reservoir could be used as a governor for filling the Clark Valley reservoir, and then for holding the surplus water. Mr. Lippincott's conclusions are: That the observed flow of Kings River for the season of 1897-98 may be taken as a minimum; that these minimum years will probably occur about once in ten years; that there will be enough water during November to February, inclusive, to fill every year the Pine Flat reservoir with a capacity of 78,197 acre-feet; that in nine out of ten years there will be enough water to leave the Pine Flat reservoir full for use after July 1; that water that would be stored in the Pine Flat reservoir is water that would otherwise be lost; that the Pine Flat reservoir would irrigate the most valuable lands in Fresno and Tulare counties, now dry and unproductive; that the cost of storage would be \$18.23 per acre-foot, and the earning power of the reservoir fully double that amount.

The Clark Valley site is in Fresno County, sixteen miles east of Sanger, and has the stage road to Millwood and the arroyo of Wahtoke Creek through the center of it. The elevation of the base of the dam is 400 feet. It is proposed to fill this reservoir by a diversion canal 53,600 feet in length, with headworks above the mouth of Mill Creek and at the Pine Flat dam site. Two additional dams would be needed to block the valley completely up. The total cost, including supply canal, etc., would be \$1,331,025; the total storage capacity would be 120,499 acre-feet of water; and the cost per acre-foot of water would be \$11.05. Mr. Lippincott thinks that the Clark Valley dam should eventually be raised to 105 feet with a storage capacity of 217,196 acre-feet, and shows by a table that, with this larger dam, there would have been only one year out of eleven when both reservoirs could not have been filled.

The report then shows that the cheapest water supply in the valley can be obtained by pumping with electric power generated by the river itself before it reaches points of diversion or storage, provided the pumping plants are operated at least half the time. A good location for the power house between the Middle and the South Forks, at an elevation of 1,980 feet, with an available head of 650 feet, was found by Mr. E. H. Green, who estimated the total cost of construction at \$271,975, and the mean minimum horse power at 7,386. The supply of water in the valley for pumping, based upon reports from over 800 existing wells, was investigated by Mr. Louis Mesmer, who concluded that 300,000 acre-feet could be obtained with

certainly by pumping from the water plane of the Kings River delta. The transmission of power and the operation of the pumping plants was investigated by Mr. Lewis A. Hicks, who concludes that the annual pump output would be 328,500 acre-feet on the basis of use for 328½ days, at a cost of \$10.50 per acre-foot produced.

By these means 200,000 additional acres of irrigated land could be added to the community.

Mr. F. H. Newell, Hydrographer in Charge, says in his letter of transmittal: "The situation on Kings River is to a certain extent typical of that along a number of important streams of the West, and as a result of this investigation it is believed that the reclaimable area can be greatly extended by the construction of storage works, and also of power plants by means of which, through electrical transmission, pumps can be operated at small expense out on broad valleys. The demonstration of these conditions will prove one of the most important steps toward the transformation and utilization of the fertile but arid lands."

AGRICULTURE IN SIBERIA.

RICHARD T. GREENER, United States commercial agent at Vladivostok, Siberia, has submitted a report on agriculture and farm machinery in Eastern Siberia, which, in part, is as follows:

"Enoch Emory came to Siberia from Cape Cod forty years ago. He was the pioneer American merchant, and now has stores at Nikolaevsk, Habarovsk, Blagoveshensk, and Moscow. Gov. Grodekoff said that he has increased the working force of the Amur territory 20,000 men by the introduction of American labor-saving machinery. Most of the supplies under the head of emigrant stores are furnished to the local government by him.

"American agricultural machines have enjoyed such an established reputation that it has long been a paying business to imitate them. The complaint now is that many cheap and inferior machines, mostly made in Germany from American models, are on the market. Since the retaliatory tariff took effect, February 7 (20), 1901, many American machines come via Germany, it is asserted, all American marks being carefully obliterated.

"At present there is no great demand for American machinery. The market is well stocked, crops are bad, money is scarce, the government is closing down on credit, and the condition of the Siberian peasant farmer is deplorable. Efforts are being made to teach the peasant how to farm. In the United States the foreign immigrant learns by everyday example rather than by theory. The Siberian peasant is not used to severe and unremitting labor; he has few wants and many holidays. Lately some highly colored reports have reached us from America as to what Siberia was capable of doing in an agricultural way. It is suggested that American flour mills on the Pacific Coast will soon be closed in consequence of the millions of acres here ready to be devoted to cereals. An uncertain climate, imperfect machinery, and unreliable labor are not factors for successful competition with the United States.

"Notwithstanding the cheap transportation offered emigrants and the development of virgin soils, famine seems a periodical visitor, and it is here to-day. The central governments are literally besieged with clamors for bread, for medicine, for work, grain, hay—anything. Tomsk, Perm, Kerson, Yaronej, Khalkinsk, all join in this demand. It is safe to say that the United States need have no immediate fear of competition from this quarter, whether it be in grain or machinery, canned goods or cotton goods, production of gold, or building of ships. The new tariff has caused a rise in the price of all necessities. It has made imperative an imperial ukase allowing employes of the Ministry of the Interior one month's pay. The appropriation has already been made."

THE NAMES OF STARS.

Who first gave stars their names? Greek mythology, to be sure, credits their naming to Prometheus. It is most remarkable that among peoples equally cultured, star myths resemble one another strikingly. The earlier myths of classic Europe take us back to a time when people had reached a point of civilization about as high as that of the American Indian. The myths and traditions of individual nations are almost identical, at least in spirit.

The folklorist, far more than the historian, realizes the touch of nature that binds all people together. The earliest Greeks of whom we have any record personified the stars as beasts. If we cross to South America, we find that the old Peruvians also worshipped the stars under the names of beasts. The name of the "Great Bear" is as old as Homer and perhaps older. Curiously enough the North American Indian calls the same constellation a "Bear." From what did the coincidence arise? Surely, not from any likeness in the stars themselves.

That the stars were once human beings is an idea that also prevails among the Eskimos. Can it be asserted that Eskimos and Bushmen and North American Indians have simply imitated primitive Orientals? Greece, to be sure, probably borrowed her myths from Egypt, but it is hardly credible that Australia should borrow its star knowledge from Greece. We must rather conclude that the personification of the heavenly bodies is an inherent tendency of the early stages of culture, and that by similar processes of observation and reasoning they have arrived at similar results.

To quote from a writer on this subject, "From savagery up to civilization there may be traced in the mythology of the stars a course of thought, changed indeed in application, yet never broken in its evident connection from first to last. The savage sees individual stars as animate beings, or combines star-groups into living celestial creatures, or limbs of them, or objects connected with them." Nature presents one school for man's education; she trains Assyrian, Hellenic, and Polynesian in the same manner. Every nation passes through its stone age to its age of metal,

and the order of folk-tales is as regular as geologic strata. Assuming also that man started from one geographic center, it may be conceded that he carried some root-ideas with him as he spread across the world. One of these root-ideas was apparently a glimmering of mythologic astronomy.

It is conceivable that the naming of stars took place before anything like practical astronomy was cultivated. It is usually thought that the Chaldeans were the first to originate the science, and to them is attributed the division of the sun's course into twelve equal parts, marked by his passage through the signs of the zodiac. But perhaps the arrangement of the zodiacal signs should be credited to the Egyptians. . . . A tale told by the natives of Australia is that the Pleiades were a queen and her six attendant damsels, but an ardent lover ran away with the queen and her maidens have ever since mourned her absence. There is certainly no lack of imagination in the myths of these Australasian natives, whose civilization was too backward to enable them to survive the contact with white culture. They conceived the sun as a woman of loose character, flaunting her red mantle, given her by an admirer, in the face of the moon, a man. There is a wilder touch of poetry in many of the aboriginal myths than in those of classic times; but we must remember that the classic myths have undergone centuries of polishing at the hands of cultured poets and romancers. The fancy of comparative moderns has never been lacking in interpreting the names of stars and constellations. One writer has supposed that the Dolphin was the fish that swallowed Jonah; and the Dragon has been imagined to be the serpent of Paradise. The sign of Lyra has been explained as the lyre of Orpheus, the harp of David, and the manger of Bethlehem; while Leo has, of course, been claimed as the Lion of the tribe of Judah. Perseus, says one interpreter, is David bearing the head of Goliath. We must be very careful not to attach weight to any such explanations. The names of stars are for the most part of immemorial antiquity. In many cases they are developments of man's early ideas of totemism and of god-ancestry. They are generally older than the tales that are now quoted with them; and, even where there is a coincidence in name and legend, we must believe rather that they sprang from a common tendency in man, than that they come from one common stock of tradition.

RARE FINDS IN ARMENIA.

THE interest of the German government in the Bagdad Railway has led it to dispatch important missions to Armenia for the purpose of making archaeological explorations in Armenia. The first of these expeditions was intrusted to Dr. W. Belck alone, and in 1898 and 1899 he was accompanied by the Assyriologist Dr. C. F. Lehmann. The report of these expeditions has just been issued, and the results to science are most important. The first indications of a civilization in the mountain-lands bordering on Lake Van were made known by the French traveler Dr. Schultz, who copied a number of inscriptions on the rocky walls of the fortress of the city of Van. Schultz, unfortunately, was killed by the Kurds, but his diaries and copies of inscriptions were recovered and published by the French government in the *Journal Asiatique*. Layard, who visited Armenia in 1849, copied a number of inscriptions, and Rassam, who made several visits to the country and excavated at Toprak Kaleh, the ancient palace of the Vannic kings, copied or took casts of several more, but the work of the German expeditions has greatly increased our knowledge of the country. The members collated all inscriptions previously copied, and increased the material for the study of ancient Armenian history by nearly two thousand lines—including the discovery of a most important and fairly lengthy bilingual inscription in Assyrian and Vannic. The most important result of the expedition has been to define clearly the extent of this empire, which had almost entirely disappeared from the field of history. The capital city was Van, on the lake of that name, called Dhuspas—the Tospas of the classics—but the royal residence seems to have been at Toprak Kaleh, called at a later period "Rusas town." The northern boundaries of the empire are uncertain, but several inscriptions were found in Russian Armenia. On the east the inscriptions were found as far as Lake Uromiyeh, and one on the rocky heights near Rowandiz, on the summit of the Pass of Keli-shin, 12,000 feet above sea-level. This inscription was first discovered by Sir Henry Rawlinson, and was set up during the joint reigns of the Kings Ispunis and Menuas, about B. C. 800. Westward, on the rocks at Palu, on the Euphrates, near Malatiyeh, the inscriptions of Menuas are also found.

ARCHÆOLOGICAL DISCOVERIES IN GREECE.

THE recent archaeological discoveries in Greece and the islands adjacent have been so numerous that a proper understanding of their general significance has been rendered difficult. Interest is at present centered in the islands of Leucas and Ithaca, because of discoveries which may shed a new light upon the home and surroundings of Odysseus. From various parts of the country come reports of discoveries, although in many cases these are mere fabrications, and, when they are not, considerable difficulty is found in securing government possession.

A rather important field is being developed on the island of Crete. Seven tombs have been unearthed within the last few months bearing every evidence of Myceanic origin and containing skeletons of men and women, marble statues, gold rings and bracelets, and various other ornaments and figures. One held a very remarkable carving in carnelian, rectangular in form, but slightly rounded on its long sides, and surmounted by two striking figures. The one represents a man in a kneeling position grappling a huge bull by the horns; the more remarkable of the two, however, is the figure of the Babylonian demon of the storm, the monstrous Typhon or Typhoon, after Assyro-Babylonian art, standing, with open mouth, upon its hind feet and holding aloft between its forefeet the figure of an animal. Upon its back it bears