size and form, was composed of pieces of limestone, all of which had been carried there. The vegetable mold, the accumulation of a long period of time, had so filled the intervening spaces that the true character of the mound was only revealed when an excavation was made. This mound was between three and four feet in height and about forty feet in diameter. Here we have unquestionable evidence of the work of man. Several other mounds, less than one hundred yards distant, were composed solely of earth and mold similar to the surrounding area.

Probably if these small mounds were not so numerous the question of their origin would never have been raised and they would have been considered, together with the larger mounds, as having been made by man, but the question of number should not influence the decision. It is doubtful if the combined bulk of all these small mounds in the Mississippi Valley is more than equal to that of the one great mound of the Cahokia group.

Without conclusive proof to the contrary, I feel that the most plausible theory of the origin of these small mounds, in Missouri and in other localities where they occur under similar conditions, is that they were made by man, probably to serve as elevated sites for habitations.

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SPECIAL ARTICLES.

THE LOCH LEVEN TROUT IN CALIFORNIA.

In the year 1896 the State Fish Commission of California sent to Captain H. C. Benson, acting superintendent of the Yosemite National Park, five hundred young trout of the species known as Loch Leven trout, *Salmo levinensis,* to be planted in waters of the park. These were placed in a branch of Alder Creek, near Wawona, where they have been allowed to remain undisturbed until the present year.

This Loch Leven trout has been usually considered as a valid species, distinct from the other trout of Great Britain, distinguished from the common brook trout, *Salmo fario,* by the large size, more silvery color, sparsity of spots, the red spots and ocelli characteristic of the brook trout, or brown trout, the trout of Izaak Walton, being usually wanting. The orange edge of the adipose fin, characteristic of the brook trout, is wanting in the Loch Leven trout. The mouth in the latter is said to be smaller, and other differences have been pointed out, but the validity of these structural distinctions has been stoutly denied by Surgeon Francis Day, who has made careful studies of the trout of England.

This fall, Captain Benson caught some fifty-four fishes from the branch of Alder Creek, derived from this plant of Loch Leven trout. These varied from two to seven inches in length, but to his surprise and dismay, he found them corresponding exactly to the markings of the English brook trout, called *Salmo fario,* as shown in the figure published by Mr. W. C. Harris. Four fishes, caught by hand in the brook, he sent to me. They are in fact, so far as one can see, exact representatives in form and color of the common brook trout as seen in the streams of England. The adipose fin is edged with orange. The sides are covered with spots of brown mixed with spots of scarlet, more or less ocellated. These Loch Leven trout in the Yosemite are typical *Salmo fario,* or brown trout of England. Dr. Day speaks of the Loch Leven trout as changing into ordinary brook trout, when planted in streams of Gloucester or Guildford, the colors of the Loch Leven trout being seen on exceptionally well-fed individuals only. In Australia, according to Day, fine examples of the Great Lake trout, *Salmo ferox,* weighing twenty pounds have been reared from eggs of *Salmo fario,* taken in Hampshire and Buckingham. Day also notes that 'a Loch Leven trout having been crossed at Howietoun by a salmon-parr, the offspring possessed the orange-tipped adipose dorsal fin which is seen in the young of the sea trout and the brook trout, and it may be asked from whence had such been obtained unless the Loch Leven possessed the blood of one of these races?' The case is exactly parallel with that of the common trout of Japan, *Salmo masou* Brevoort, which is mature at all sizes from three

ounces to fifteen pounds, and which loses its colors and spots when it enters the sea or when it reaches a large size. Similar changes are shown in each of the four coastwise species of trout of the Pacific coast.

The explanation is apparently this. The trout in Loch Leven is identical as to species with the ordinary brook trout of England. The character of the food supply and of the water of the lake determine its color and appearance. These acquired characters are not hereditary, but are results of conditions in the growth of the individual. The lake trout planted in the brooks grow as other brook trout do. In estuaries of rivers they assume still other characters, and these are equally temporary.

I have no doubt that Dr. Day is right in regarding the large salmon trout of the English bays (*Salmo trutta* L., *Salmo eriox* L., *Salmo cambricus, Salmo albus, Salmo phinoc, Salmo brachypoma*), the golden trout of the estuaries (*Salmo estuarius, Salmo orcadensis, Salmo gallivensis,* etc.), the silvery trout of the various lakes (*Salmo levinensis, Salmo cæcifer*), the great black lake trout (*Salmo ferox, Salmo nigripinnis*), the 'gillaroo,' with the stomach coats thickened (*Salmo stomachicus*), and the common trout of the brooks of northern Europe (*Salmo fario* L., *Salmo ausonii, Salmo gaimardi, Salmo cornubiensis*) as all forms of one and the same species. A member of one of these so-called species would be changed to one of the others if it grew up under the same surroundings. These forms are not subspecies, for that implies a divergence which should be hereditary, however slight. They are, if this view is correct, local variations of one species, for which the oldest name is the half-forgotten one of *Salmo eriox* Linnæus.

A practical question with fish-culturists arises here. "The riparian proprietor," says Dr. Day, "sends for, let us say, *Salmo ferox,* to improve the strain of his local race by crossing, and after a year or two he feels confident that the imported forms are only brook trout. Naturally indignant, he may come to the erroneous conclusion that the purveyor has imposed on him and it will not be until he understands this is a simple variety attaining a large size, due to certain local circumstances, that he will comprehend how his money has been thrown away. He had far better look to the food and condition of the water on his estate before attempting to improve the indigenous breed."

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THE RELATION OF SOIL TEXTURE TO APPLE PRODUCTION.

THE problem of the intelligent selection of an orchard site by a person who contemplates engaging in the production of apples on a commercial scale, or even in a small way, resolves itself into several factors. The climate must be suitable and the physiographic features, including exposure and the attending surface conditions, aeration and drainage, must be favorable. The relation borne to variety by climate, and to a lesser degree by physiographic position, must be carefully determined, for whereas a considerable part of the United States is suited to apple production, certain important varieties, as the Albemarle Pippin, may be successfully grown only in very restricted areas. Other varieties, such as the Baldwin, succeed over a large scope of territory, but still are adapted to only a small part of the general apple belt, while the extent of the range of adaptability of countless other varieties may be said to lie somewhere between those of the two varieties mentioned. Such limitations of variety, however, are known in a general way and with this fund of past experience available the planter need not go far astray in the selection of varieties for his orchard. In the Albemarle area, Virginia, for example, Mooney found that the York Imperial grew to the best advantage in a valley; whereas 'on the eastern side of the Blue Ridge it ripens early, and falls, and does not have as good keeping qualities.'

Again, the Albemarle Pippin[1] thrives on

[1] See Report on the Albemarle Area, U. S. Dept. of Agriculture, Field Operations of the Bureau of Soils, 1902. Report on the Mount Mitchell Area, U. S. Dept. of Agriculture, Field Operations of the Bureau of Soils, 1902. Report on the Bed-