dance, but not anywhere on the *surface* of the plant except at its base. The mycelium extended upward inside this stem two thirds of its length. On another plant in this pot *Diplodia* was also found in fruit on the crown, and the mycelium was present in the interior of the stem but did not extend upward for any distance.

On the same day in another pot the mycelium was found in the parenchyma and bundles of the roots of one plant. Pieces of the roots were put into damp chamber and in five days the pycnidia of *Diplodia* appeared in great numbers.

The same day in a third pot the mycelium of *Diplodia* was found not only in the interior of the roots but also in the interior of the first two internodes of the stem, from which pure cultures of it were obtained. Here again it was not present on the surface.

The next day in a fourth pot *Diplodia* was found fruiting on the stem in the first four internodes as a result of the presence of internal mycelium. This mycelium was also demonstrated in the interior of the fifth internode, and pure cultures of it were obtained from the interior of this stem. Generally the pycnidia were most abundant at the nodes. They occurred also on the leaf sheaths.

The following summer (1908) the experiment was repeated in a plot out of doors by means of soil inoculation with pure cultures, but, owing to a late start and the fact that the plants had to be dug up early to make room for a new building, the experiment was a failure, except that there were indications of infection in the basal nodes and internodes of two plants. Experiments are under way again this summer.

There seems little doubt that the manner of infection indicated is the common one, *i. e.*, from the soil into the roots, from these to the interior of the stems, and thence upward to the cobs, and finally to the kernels, but it is not unlikely that certain soil conditions may favor or hinder the root infection. This remains to be worked out. Unquestionably the *Diplodia*, like the *Fusarium*, is a soil organism persisting from year to year in infected fields, which for this reason should be staked off and planted to other crops than corn.

It is also worthy of inquiry whether this fungus may not be the cause of the so-called "cornstalk" disease prevalent among cattle in the west. It is also possible that to *Diplodia* should be referred the great numbers of deaths of negroes in the south during the past three years from the so-called pellagra, following the consumption of moldy cornmeal and moldy hominy. This fungus (*Diplodia*) is also a cause of moldy corn in Italy. The only other fungi we have reason for suspecting in this connection are species of Aspergillus. The writers would be very glad to receive for study samples of hominy or corn meal suspected of being the cause of pellagra.

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WASHINGTON, D. C.,
July 23, 1909

SOCIETIES AND ACADEMIES

THE GEOLOGICAL SOCIETY OF WASHINGTON

AT the 218th meeting of the society, held at the Cosmos Club, on Wednesday evening, April 14, 1909, Mr. David White presented as an informal communication some notes on the "Kent Coal Basin of Southern England." Calling attention to Professor E. A. Newell Arber's paper in the February number of the *Journal of the Geological Society of London*, in which the fossil plants from the deep drillings near Dover, England, are described, he pointed out that the three workable coals, 1,881–2,377 feet deep in the Waldershare core, are paleobotanically either Mercer or Clarion in age, probably the former, though both ages may be represented. The boring about 6 miles farther south, on the coast, cuts 13 coals between 1,100 and 2,270 feet, in a more arenaceous series, also of older Pennsylvanian age. The drillings therefore indicate a considerable number of workable coals in the basin (Kent) passing beneath the Channel at Dover.

Regular Program

Débris Tracks on the Domes of the Yosemite Region: Mr. F. E. MATTHES.

The Yosemite landscape is characterized by many large expanses of smooth, bare granite. Over these different things move or have moved at various times: water in sheets, rills and streams, snow and glacial ice, and with each of these carriers, rock débris in varying quantities and states of comminution. As a consequence these rock surfaces are scored, marked and striped in sundry ways. The nature of these different markings is well understood; yet there is one kind among them that appears scarcely to have received recognition, namely, that produced by creeping rock débris. It is on gently inclined surfaces, such as obtain on the crowning portions of the Yosemite domes that the conditions are most favorable for their development. Loosened rock fragments here slide or creep down at the rate of perhaps but a few inches annually. The frictional resistance of the smoothly curved granite surface being very slight, but little force is required to propel the fragments in downward direction. Probably a number of agents are involved, but snow and water no doubt furnish most of the necessary energy. As the fragments advance they leave trails or tracks behind, conspicuous by their whitish color. Close inspection reveals that these consist simply of paths from which the lichens and mosses that cover the rock surface everywhere and give it its subdued grayish tint have been cleared off. So slow is the progress of the débris, however, that the removal of the lichens can obviously not be attributed to mechanical abrasion. Picking up a fragment one finds its base invariably embedded in a pad of loose rock grains. Now lichens can not live under even the thinnest film of sand. The explanation therefore seems to be that the pad of sand grains kills the lichens under it, and as it moves along with the larger fragment, leaves a clean swath behind. The process is evidently as effective on a small scale as on a large one. On the little-frequented slopes of Liberty Cap and the other lesser domes of the upper Yosemite region, where the débris has a chance to travel year after year, undisturbed by man or animals, rocks of every size down to that of a pea were observed, each at the lower end of a whitish track of proportionate width. Some of the tracks were but a few inches long, but many of them measured several yards. On a bared portion of the rock floor of the Little Yosemite Valley the phenomenon is revealed on a grand scale and wholesale fashion. Several acres of smooth granite here appear blotched, as it were, with a multitude of long whitish stripes and streaks. The débris by which the latter were produced, however, has long since vanished and the rock floor has now a clean-swept look. The cause of the disappearance of the débris may be inferred from the character of the tracks. The latter frequently fork downward, once or several times in repetition. The rock fragments, probably of glacial origin to begin with, must have disintegrated on the way, falling apart in successively smaller pieces, until at last they were resolved into little heaps of loose rock grains that were easily swept away.

Observations on the Recent Calabrian Earthquake: Mr. C. W. Wright.

This paper was published in the *National Geographic Magazine* under the title of "The World's Most Cruel Earthquake," and no abstract is therefore given here.

At the 219th meeting of the society, held at the Cosmos Club, on Wednesday evening, April 28, 1909, Mr. David White presented an informal communication on "Graphic Methods of Representing the Regional Metamorphism of Coals." He exhibited a map covering a portion of the Appalachian trough on which the fixed carbon of the coals (ash and moisture free) was platted according to the location of analyzed samples and contours were drawn showing the degrees of devolatilization in passing from the western margin of the coal field to the Anthracite regions. This method not only shows successfully the progressive devolatilization, as the result of deep-seated thrust pressure, of the coal, the greatest alteration marking the greatest pressure, but it also illustrates the fact that folding and faulting, though valid as proof of thrust action, did not always attend the greatest devolatilization, since they, in some instances, undoubtedly gave relief from long continuance of possible maximum pressure, while pressures, perhaps lower but exerted for a longer time, without relief by plication, in contiguous areas, effected greater changes in the fuel. The method was recommended as direct, without recourse to ratios, and simple, being based on proximate analyses. It illustrates in a striking way the improvement of the bituminous coals as the result of regional metamorphism. A similar platting and "contouring" for the same area, of the carbon-oxygen ratios (dry coal, the oxygen compensated for sulphur) show these contours not only to conform in general to the fixed carbon contours, but also better to express the regional changes in the "heat value" of the coals.

Regular Program

Geology of the Mexican Oil Fields: Mr. C. W. HAYES.

Geology of the McKittrick-Sunset District, California: Mr. H. R. JOHNSON.

The Temblor Range, along the northeast slopes of which the McKittrick, Midway and Sunset oil fields of California are located, includes, besides a limited amount of granitic and metamorphic rocks of pre-Cretaceous age, unaltered sedimentaries of Cretaceous, Tertiary and Quaternary age. Briefly the formations comprising the unaltered sedimentary series are as follows:

Knoxville-Chico (Cretaceous) Sandstone.—These include between 7,000 and 12,000 feet of dark green, well laminated and usually nodular shales with intercalated sandstones which predominate in the upper portion of the series. Some of the sandstone includes zones of hard chocolate brown nodules of considerable size, which give the beds an appearance typical of the Cretaceous in the region. The Cretaceous was probably deposited upon an eroded surface of the pre-Cretaceous metamorphic complex known as the Franciscan formation in the Coast Ranges.

Tejon Sandstone (Eocene).—This series of yellowish brown somewhat nodular sandstone with a small amount of intercalated clay shale reaches a maximum thickness of about 2,500 feet. It extends from the Devils Den and Antelope Valley region southeast with considerable continuity along the northeast flank of the range nearly to Temblor Ranch. Although a non-conformity between the Tejon and Knoxville-Chico series is known to exist, there is little field evidence of this condition in the region.

Wagonwheel Formation (Oligocene?).—This is a local occurrence of sandstones and several layers of white diatomaceous shales which appear to be of Oligocene age upon paleontologic evidence. If this determination is correct it marks the first discovery of marine Oligocene in the San Joaquin Valley of California. The beds are located in the isolated group of hills south of Bartons and northeast of the Point of Rocks in the Devils Den District.

Vaqueros (Lower Miocene) Sandstone.—This is a fairly continuous and usually easily recognizable massive yellow sandstone including a couple of fossiliferous reefs which, because of their superior hardness, are easily traceable for long distances. The formation is well distributed over the field and is of variable thickness, its maximum probably being east of Annette, where over 2,000 feet has been measured. Elsewhere the formation is less than 100 feet thick.

Monterey (Lower Middle Miocene) Shales.—Characteristic areas of this siliceous and calcareous formation exist at a number of points in the region. The largest of these areas occupies the bulk of the Temblor Range from west of Temblor Ranch southeast to the limit of the region studied. It is exposed on either flank of the range for a number of miles northwestward from this mass and overlies the Vaqueros sandstone conformably. The maximum thickness measured, in which, however, the beds may be doubled by close overturned folding, is about 4,000 feet, a thickness considerably less than the Monterey at other points in the state. At the base of the Monterey there are beds of sandstone transitional into the Vaqueros and at several horizons in the formation similar sandstone lenses occur. In a general way it may be stated that the lower half of the Monterey includes a higher proportion of calcareous and siliceous shales than the upper part, in which the diatomaceous facies becomes more prominent.

Santa Margarita Formation.—This formation includes rocks of considerable variety, but along the northeast flank of the Temblor Range heavily bedded diatomaceous shales are characteristic of it. While the formation rests unconformably upon the Monterey there is little difference in dip between the two series, and except for greater hardness in the older and the predominance in portions of the field of diatomaceous shale in the younger formation, there is slight stratigraphic basis for their separation. Southwest of Midway the characteristic diatomaceous shales of the Santa Margarita are intercalated with lenticular beds of heavy granitic material which offers striking contrast to the very fine organic shales with which they are associated. The great difference in texture and origin of these two facies is indicative of remarkable topographic or climatic oscillations during the period of deposition of the Santa Margarita, and presents an interesting question for future solution. The total thickness of the Santa Margarita is about 1,500 feet.

Etchegoin-Jacalitos Formation.—This term has been rather loosely applied in the field to a series of clays, soft shales, gravels and loosely consolidated sands which lies unconformably above the Santa Margarita. It is of wide distribution throughout the region and its uppermost beds are the latest to have suffered deformation. Its thickness is very variable but the maximum may be stated as about 2,000 feet, although upon the

southwest side of the Temblor Range a thickness of 3,700 feet has been measured.

Quaternary Deposits.—The fluviatile sands, clays, soils and gravels which are the results of erosion since the latest deformation in the region, have been included under this head. Exception to the above statement must be made with regard to some of the gravels along the San Andreas fault line, upon which movement and resulting deformation have taken place even within historic times. Such a classification will exclude all except the stream alluvium and fine material skirting the range and some of the gravel remnants left upon the canyon slopes above the present drainage lines. Along the margin of the San Joaquin Valley there is the usual type of fine material, a result of the coalescence of detritus from a number of sources. Some small valleys of Quaternary material lie at several points within the mountain ranges but except in the larger examples the material has not been mapped.

Structure.—The structure of the McKittrick-Sunset region is very complicated. In general, the range may be considered as a block faulted upward along either side at such a recent date, geologically speaking, that the escarpments so produced have been well preserved. Accompanying this faulting were developed a number of major anticlinal structures, the axes of which are not exactly parallel with the axis of the range, but diverge from it at a low angle toward the southeast. The result of this folding has been to produce a number of prominent salients extending southeasterly away from the main range. Toward its southern extremity the structure of the Temblor Range is affected by the Tehachapi uplift. This is well exemplified in front of McKittrick in the Elk and Buena Vista hills, the structural axes of which swing toward the east and at some places are almost at right angles to the trend of the main range. Here even more than elsewhere in the United States the structural conditions play a very important part in the accumulation of petroleum, and in consequence the folds and faults have been studied and mapped with considerable care, especially in the Sunset, McKittrick and Midway fields; special maps having been prepared which indicate the relations between the structure and the oil developments already made.

Oil Resources of the McKittrick-Sunset District, California: Mr. Ralph Arnold.

Francois E. Matthes,
Secretary

The New York Academy of Sciences
Section of Biology

A regular meeting of the section was held at the American Museum of Natural History, May 10, 1909, Mr. Frank M. Chapman, chairman of the section, presiding. The following papers were read:

Bufo agua in Bermuda: Professor Charles L. Bristol.

The Relation between the Taxonomic Characters of Crickets (Gryllus) and the Environment: Dr. Frank E. Lutz.

The speaker stated that the species of *Gryllus* are distinguished chiefly by the actual and relative sizes of the ovipositor, posterior femora, wings and tegmina. The length of the ovipositor is correlated with the character of the soil, being longer on sandy soils than on the firmer ones. This is probably brought about by selection destroying the eggs which are not deeply placed in loose soil. The length of the wings seems to be a function of three variables: ancestors, heat and moisture. Increased heat and moisture are accompanied not only by an increased percentage of the long-winged dimorphs, but by a greater wing length of the short-winged group. No relation has been discovered between the size of the posterior femora and the environment. These conditions bring about marked differences between the crickets in different habitats, and these differences are of "specific" rank.

Deleterious Ingredients of Food: Dr. E. E. Smith.

It was shown in this paper that food itself is deleterious if ingested in sufficient quantity. This is not an essential quality of food, but one dependent on the quantitative relation. Any ingredient added to food is deleterious in the quantitative sense, precisely as food itself is. The statement of the Food and Drugs Act, June 30, 1906, "an article shall be deemed to be adulterated, in the case of food, if it contain any added poisonous or other added deleterious ingredient which may render such article injurious to health" is to be interpreted as referring to ingredients that are essentially deleterious. Substances that serve a useful purpose in amount widely separated from the quantity that may produce injurious effects are not essentially deleterious, even though they may become deleterious by abuse of the quantitative relation.

Frank M. Chapman,
Secretary pro tem.