

the palpable evidence of the tremendous efficiency of wind-friction, and realizing the extreme slowness of readjustment of disturbed equilibrium by a slight difference of specific gravity, the other factor, I am compelled to give in my adhesion to the party, very respectable in numbers and intelligence, who ascribe the greater efficiency to the friction of wind.

So far as the surface-gradients of the ocean are concerned, I must say that I regard them of no significance in this discussion. One has only to turn to Dr. Penk's 'Die schwankungen des meeres-spiegels,' and read the record which he and the authorities he quotes have made, to see that along the coast sea-level is altogether a local phenomenon, and is dependent upon the altitude and position of the neighboring land-masses. Where the shores are lofty mountains, there the water attracted by them rises above the normal; it also rises on both sides of the Atlantic, and is probably ten or twelve feet lower in the middle than on either side.

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The genesis of the diamond.

Prof. Carvill Lewis, in his remarks on 'The genesis of the diamond' (*Science*, viii. p. 345), briefly alludes to the peridotite of Elliott county, Ky., as 'suggesting interesting possibilities.' My notes (*American journal of science*, August, 1886, p. 121) on this remarkable eruptive rock are but a brief digest of a report (Bulletin No. 38, U. S. geological survey, not yet published) in which its peculiar features are more completely described. If the hypothesis advanced by Professor Lewis really accords with nature's method of manufacturing this precious gem, it gives to prospectors a most valuable guide; and it is well worth while to carefully examine all localities the geological composition and history of which are analogous to that of the South African diamond-fields.

In Elliott county, Ky., near Isom's mill, six miles south-west of Willard, there are two short dikes of peridotite breaking through the horizontal sandstones and shales of carboniferous age in such a manner as to locally envelop many of their fragments. The slopes in the vicinity are well covered with soil, so that there are but few exposures of either the intrusive mass or the adjacent strata near the line of contact between them; and no considerable excavations have been made. Nevertheless it is evident that the shales have been distinctly metamorphosed by the peridotite. This is most plainly visible in the enveloped fragments of shale, which are quite numerous in the dike at one exposure near Isom's mill, but elsewhere they are almost or entirely absent. Thus both varieties of peridotite described by Professor Lewis occur in Kentucky, but the brecciated form has not yet been found to contain diamonds.

The dark shale, fragments of which are included in the peridotite, may be regarded as composed of sand and clay in varying proportions. The amount of metamorphism experienced by the small fragments of shale is very unequal, and by no means proportional to the sizes of the inclusions. One of the earliest and predominant metamorphic effects is the development of a micaceous mineral in the argillaceous cement. This development may extend so far as to render the inclusion chiefly micaceous. Each enveloped fragment is surrounded by a narrow zone of colorless mica, the scales of which are frequently arranged perpendicular to its surface. An

advanced stage of metamorphism is marked by the appearance of very interesting spheroidal bodies with remarkably suggestive properties. They have a high index of refraction, and are pale yellowish to colorless, translucent to almost transparent, and completely isotropic. The diameter of these little globules is generally about .02 of a millimetre, and they are remarkably uniform in size. Rarely this substance appears in irregular grains; but generally it occurs in a form very suggestive of the diamond, for it resembles a hexoctahedron with curved faces. In general appearance it simulates the small translucent crystals of octahedrite in the adjacent peridotite, but their optical properties and action in acids readily distinguish it from that species. They are soluble in concentrated hydrochloric acid, and, when heated to bright redness, they become less translucent and somewhat earthy in appearance; but the change is not prominent. In the small fragments the globules are usually numerous, and scattered throughout the scales of clouded mica, but most abundant and least regular in form near the periphery of the inclusion, where they sometimes form quite a distinct border just inside the one of colorless mica. In the fragments where this peculiar isotropic substance is most abundant, there is but little well-developed mica. Notwithstanding the fact that some of their properties suggest that they are diamonds more or less perfectly crystallized, their solubility in acid renders such a view untenable. Were they diamonds, they would be of comparatively little value, because of their exceedingly small size.

The dark shale which is frequently enveloped by the peridotite is somewhat carbonaceous, but contains a small proportion of carbon as compared with that of the South African diamond-field: for this reason, it appears to me rather improbable that diamonds will be discovered at the locality in question.

Some very pretty pyropes, locally supposed to be rubies, have been picked up in the soil resulting from the decomposition and disintegration of the peridotite, but nothing of greater value has yet been discovered at that place. That the dikes have been prospected, and supposed to contain valuable metals, is evidenced not only by slight excavations, but also by the ruins of what appears to have been a structure for reducing ore. Nothing is known in that country of the history of these ruins, and they may be of considerable antiquity.

It appears to be a significant fact in favor of Professor Lewis's hypothesis, that the diamonds found in the United States have been discovered where peridotites abound. The chief localities are either in North Carolina and Georgia or in California. Of all the mountain-ranges of this country, the northern portion of the Sierras in California is perhaps the richest in serpentine. In cases I have examined, the serpentine is derived by alteration from peridotites. In the same region, among older stratified rocks of the auriferous series, is a black shale or slate which occasionally contains a considerable amount of carbonaceous matter; and it is quite possible that the diamonds which have been discovered in the Sierras had their origin along a contact between peridotite and carbonaceous shale. At any rate, the suggestion opens another field for prospectors, and it should be remembered that corundum, with its gems, is also found under similar geologic conditions.

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