

The 1925 Marsh expedition to Darien including, it is hoped, geneticists, ethnologists and anthropologists, will have the task of solving this unique racial mystery.

Mr. Marsh intends to take the five brown Indians back to Darien with him, but he hopes to be able to keep the three White Indian children in this country and educate them in American schools.

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#### MAGNETIC MACHINES SAVE COAL NOW LOST IN CLINKERS

Electro-magnets of great power are used in new types of fuel-saving machinery, to pick the clinkers out of the unburned coal. The first successful tests of these machines in this country are described by Rudolph Kudlich, of the Bureau of Mines, U. S. Department of the Interior.

The principle underlying the new type of clinker separator depends on two simple facts; first, that clinkers and coal do not fuse together, and second, that practically all clinkers contain a little iron and are therefore weakly magnetic. The new machines pass crushed furnace wastes under electro-magnetic drums, which lift out the magnetic clinker particles and permit the non-magnetic coal to pass on, to be returned to the bins.

Savings well worth figuring on may be effected by salvaging unburned coal from furnace wastes. One well known combustion engineer estimates that the average amount of combustible in the refuse from a large stoker fired central station boiler plant is about fifteen or twenty per cent. Assuming that the coal burned contains twelve per cent. of ash, and allowing for flue dust losses, approximately two per cent. of the original coal is thus carried out, unburned, in the ashes.

Most of the methods of coal salvage at present in operation involve the use of water, to float off the light particles of half-burned coal, while the heavier clinkers sink. Such systems, however, are claimed to be less efficient than magnetic separation.

The magnetic method has already been tested in Europe, where fuel costs present even more serious problems than they do in this country. Tests reported by a German firm showed recoveries up to eighty-seven per cent. of the combustible in the refuse.

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#### RICKETS CURED BY ULTRA VIOLET LIGHT CAPTURED BY FOOD

The mystery of why rickets can be cured by so dissimilar treatments as administration of codliver oil and exposure to sunshine has been solved.

Cod liver oil and other substances curative of rickets are bottled sunshine.

When substances curative of rickets are exposed to the air or utilized in the body, they actually give off ultra-violet light, the same sort of radiation to which the sunlight and the radiations from mercury quartz lamps owe their effectiveness.

This is the discovery just announced from the Department of Pediatrics of Yale University by Prof. I. Newton Kugelmass and Dr. Irving McQuarrie. And

Dr. Walter F. Baughman and George S. Jamieson of the Bureau of Chemistry of the U. S. Department of Agriculture also report that oils and fatty acids, such as the substances curative of rickets and those exposed to the sun, give off a radiation strong enough to darken a photographic plate.

The recent work of Prof. Harry Steenbock of the University of Wisconsin has shown that various foods, not antirachitic, when exposed to the sun become as effective in preventing rickets as foods containing the antirachitic vitamin. Dr. A. F. Hess of Columbia obtained the same effect from cottonseed oil exposed to ultra-violet rays from a mercury lamp. It is also known that children and young animals who get frequent sunbaths do not develop rickets whether they receive antirachitic factor or not. It seemed reasonable, therefore, that sunlight changes foods in some way, converting part of their substance into the antirachitic vitamin, or at least something "just as good."

The experiments of Prof. Kugelmass and Dr. McQuarrie showed that substances curative of rickets, like cod liver oil, as well as substances lacking in that power produced photographic effects on the plates when placed in close proximity. But the curative substances produced a stronger effect than the others. They would work through screens of quartz, while the non-curative substances would not. This proves that the photographic effect was due to ultra-violet rays and not to ordinary light, because none of the substances could work when separated from the plate by ordinary glass, which is opaque to ultra-violet. It seems clear therefore that the curative effects of the antirachitic diet is bound up in some way with the giving off of ultra-violet rays by substances in the food.

An entirely new effect was noted in these same experiments. All of the food materials studied, whether they were in themselves curative or not, became capable of affecting photographic plates when they were treated with oxygen. When the oxygen was driven out again, they lost the power. And the more highly oxidized the substances became, the more strongly could they affect the plate. The scientists conclude that the power of giving off ultra-violet rays, and therefore the value in the treatment of rickets is dependent upon oxidation.

The Yale scientists conclude: "These experiments point strongly to the common property of emitting ultra-violet rays, of cod liver oil, egg yolk, sperm oil, bile, hydroquinone on the one hand and of sunlight or quartz mercury vapor radiation on the other, as the basis for their identical curative action in rickets.

"The experiments may be applicable to physiologic phenomena in general. Not only do they suggest the mechanism common to all rickets-healing processes and imply a method to measure the therapeutic potency of the curative agents but they also disclose the fact that solar energy exerts a hitherto neglected function in the physiology of higher organisms as well as in plants."

In the Department of Agriculture experiments, dishes containing various oils and substances chemically derived from oils were covered with photographic plates and left in the dark from two to eighteen hours. The plates then were developed, and it was found that many of the substances had given off rays capable of making a photographic image. The oils do not seem to have this power by themselves, but gain it from exposure to sunlight.

"Freshly pressed vegetable oils or rendered fats are not active but exposure to sunlight for several hours causes them to become active," say Dr. Baughman and Mr. Jamieson. "Heating to approximately 120 degrees Centigrade for several hours destroys or greatly reduces the activity. Blotting paper placed over very active oils becomes permeated with the active substance and capable of affecting a plate."

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