Terrestrial Magnetism, Carnegie Institution of Washington, part of which was published more than a year ago, has demonstrated the overwhelming importance of various contaminations in experiments of this kind. This work still stands, and the importance of contaminations is not superseded by any discussion of energies of particles or of measuring technique. Resolution of the outstanding discrepancies between our findings and those of the Berkeley investigators came about through their abandonment several months ago of a striking hypothesis with quantitative consequences that they had claimed were demonstrated by their observations, but which they were notified could not be substantiated in Pasadena, in Cambridge nor here in our laboratory, and by their admission at that time and recently in a paper on another subject that spurious effects have been present in their observations, due to various contaminations. Their published reports of sharp voltage-thresholds, which have been sought for but not verified, automatically invalidated any work carried out at voltages below their announced values, and delayed somewhat the examination of these questions. These facts were matters of record in the *Physical Review,* and at Berkeley I avoided this type of emphasis.

At the time of the Berkeley meeting, one of the few remaining respects in which a comparison of our results was possible concerned the identity of the contamination affecting certain of their observations. This is a question of quantitative absolute yields, and, although our experiments have shown that heavy hydrogen (present in these experiments) is a very prolific source of spurious disintegration-effects of this type, the Berkeley investigators believe that carbon was the contamination affecting their results, on the basis of certain findings of the Cambridge investigators. Our yield for carbon (ascribed by us to H^2 contamination) was 25 times greater than the only comparable result (for a "brass-wax" target) published by the workers in Berkeley as taken at the same voltage, and this in turn is greater by a factor of roughly 1,000 than the value for carbon published from Cambridge (which was taken at a different voltage with no existing data which would give a reliable correction for the change in voltage—absolute yields are expressly disclaimed in their paper). I therefore restricted my remarks to carbon, and for these and other quantitative reasons readily agreed that the reality of a small proton-emission from carbon was not disproved by our gas-phase experiments, leaving the question an open one. The latter experiments only set an upper limit to the effect at a given voltage and indicated the necessity for proving that heavy hydrogen was not responsible. This type of proof that a contamination is not responsible for the effect is essential in every case where a positive result is claimed in disintegration-experiments, since contaminations were theoretically predicted to be of enormous importance, and beginning with March, 1933, have been proved responsible for many of the strikingly unexpected results so far reported.

The question of the induced radioactivity of carbon under proton-bombardment, in which our findings differed from those of the investigators at the California Institute, is a matter of apparently real differences in our experimental results, with contradictory indications, as well as of voltages and of technique, all of which I remarked in my talk. Strenuous efforts are being made in both laboratories to resolve this difficulty.

The conclusion expressed in the above-mentioned secretaries' report, apparently as a consequence of my paper, that all results to date can be fitted together to make a "consistent picture," that they are "not contradictory in the least, but rather supplementary," is an optimistic one for which I am not responsible, and to which I do not subscribe. The whole point of my paper, devoted to illustrating some of the difficulties encountered in this type of work, was that because of these quantitative and qualitative differences in results, and the different conditions under which they have been obtained, very few conclusions can yet be accepted with confidence in this new field.

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TRAVERTINE DEPOSITS NEAR LEXINGTON, VIRGINIA

LARGE travertine deposits near Lexington, Virginia, are found only in association with rapids and falls, their localization being largely due to algae and mosses. The most important travertine builder was the moss *Philonotis calcarea.* It grows outward from the face of the falls, its compact foliage on the surface, smothering the basal foliage from which it grew, but nature forestalls the collapse that would ensue by reenforcing the base with a sheath of crystalline calcite. The moss thriving only in the foamy water at the top and front of the falls, the travertine deposit starts on the face of the falls and grows vertically as well as down-stream. By this process of accretion some falls were raised 25 feet above bedrock and their front was pushed more than 100 feet down-stream. The living foliage shows no calcite, excepting a little in the basal part. Most of the calcite gathers on the dead tissue in tiny, very fine-grained nodules.

Flat beds of travertine, with many imprints of leaves, tree trunks and other plant structures, all of living species, were deposited in the pools above and below the falls. Their high calcite content, 80 or more per cent., attest the clarity of the waters which formed them. The cascade deposits average even lower in detritus, the mosses having acted as a filter. The present muddiness of the streams after rains is believed to be the reason for the mosses having been reduced to meager patches. With the decline of the mosses, the streams have started eroding the travertine. The channels have been lowered from 10 to 25 feet below the highest travertine levels, and the falls have receded along narrow channels by as much as 100 feet. In one case, the outermost travertine wall is 130 feet high and 200 feet wide. No evidence of an earlier destructive stage has been found. The streams still deposit travertine, but without the mosses erosion outstrips retention.

The cascade deposits are distinctly stratified. Most of the dips are very steep, but some are as low as 40° down stream. Porous strata, one to two inches thick, with fossil moss normal to the strata, alternate with thinner, more compact layers with less distinct mossy structures. Parting surfaces between strata are generally lacking, but the stratiform structure is very distinct, resembling a coarse wavy gneiss. The lush growth of summer forms the porous layer. In the winter, the moss is matted down and almost buried in calcite. Winter yields the compact layer. The insoluble matter of the winter layer averages about twice the amount present in the summer layer, and its average grain is about twice as coarse as that of the summer layer. Quartz and feldspars are the main insoluble constituents. The strike of the strata is undulating with wide, gentle convexities facing downstream, and sharp narrow troughs pointing upstream. Each bulge down-stream was once a pulpit-like salient on the face of the falls, draped with moss and covered by falling water. The rapid growth of the moss sometimes formed overhangs, which became caves, and their counterpart can be seen where mosses cling to the top of the falls at the present time.

An abundance of concentrically stratified concretionary forms, encasing tree trunks and other plant structures, show that calcite did not replace plant materials. Hollow casts are the rule. Woody residues rarely remain. That these concretions are largely primary is shown by the travertine not reorganizing into concretionary forms around the large roots of trees that penetrate it. However, slender pipes of calcite commonly enclose thin rootlets which actively absorb water from the travertine.

Rise in temperature of the stream waters is the most plausible inorganic cause of precipitation of the travertine. In summer the streams are warmer than the springs which feed them. In winter the reverse is true at least part of the time. Variations in the partial CO_2 pressure of the atmosphere are believed to be unimportant as a cause of deposition. It is also difficult to see how photosynthesis would disturb the equilibrium of the CO_2 in the foamy waters of the falls. Since travertine gathers so extensively on dead plants, it is believed that decay may have been a factor in deposition. The possibility that unknown factors may be important is suggested by the high calcium content of one of the streams, (the only one analyzed) during the past winter. It held about twice as much calcium as is present in a saturated solution of the bicarbonate at a similar temperature and partial atmospheric pressure of CO_2. Sulfate and chloride were negligible. The excess of calcium suggests that it is partly in colloidal suspension or that some unsuspected factor influences its behavior.

The biological and chemical phases of the travertine problem are being studied by R. P. Carrol and W. F. Young, respectively. H. F. Hinkle and others are giving valuable assistance. Financial aid has been given by the Virginia Academy of Science.

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LIFE HISTORY OF THE GOLD-BANDED SKIPPER (RHABDOIDES CELLUS)

THE handsome gold-banded skipper (*Rhabdoides cellus*) is one of the rarer butterflies in the eastern states.

In the vicinity of Washington it first appears late in May, flies throughout June, attaining its maximum abundance shortly after the end of the third week, and disappears soon after the first of July. Occasional individuals probably appear throughout the summer, but the only records are July 20 and 30.

The food plant is the hog-peanut (*Falcata pitcheri*) on the larger leaflets of which the young larvae make characteristic limpet-like shelters, the last stage larvae simply rolling in the border of the leaf, and later fastening two leaflets together.

The eggs, which are deposited in little strings of usually from 2 to 4, sometimes of 5 or 6, rarely singly, closely resemble the eggs of *Thorybes,* but have from 15 to 21 (most commonly 17) ribs.

The caterpillars are apple green, lighter below, on the prolegs, and at the tip of the body, with a broad sulfur yellow dorsolateral line, a rose pink neck, and the head claret brown with two large chrome yellow spots.

The pupa, which is much like that of *Thorybes,* is covered with a thick whitish or light lavender gray bloom that entirely conceals the surface sculpture.