ascribed to, another one of us examined the leaves under ultraviolet radiation. Of 11 samples classified in the field as definitely showing smog markings, all exhibited the fluorescence after drying for a day. These markings included silvering on spinach and nettleleaf goosefoot, bronzing on romaine, lower-surface injury on beets, and white markings on *P. annua*. Of nine samples classed as having light smog damage, six fluoresced after drying for a day. Those that did not fluoresce may not have been damaged enough to cause extensive cell collapse (an apparent requisite for fluorescence). Nine samples were classified as having questionable smog markings. Six of these showed some fluorescence. The remaining samples were either not marked or were marked by some factor other than smog. Most of them showed no fluorescence at all, and the others showed either mild background fluorescence or the types produced by mildew and insects.

The reason for the development of the fluorescence of these leaf markings is not known, but it may be related to the "browning reaction" (*7*). In this reaction, a bright blue fluorescence in ultraviolet light develops in foods before the formation of the characteristic dark brown color.

In summary, the leaf markings that result from smog, and are the cause of extensive economic loss, appear to fluoresce distinctively under ultraviolet radiation. This observation has been checked by comparing the response to ultraviolet radiation of sensitive plants exposed to actual smog, to synthetic atmospheres, and to a variety of cultural conditions.

If further work confirms the results of these studies, the bright pale blue fluorescence of smog-marked leaves will provide the first objective means of assessing the responsibility of smog for vegetation damage.

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Desert Varnish

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Desert varnish is a blackish or brownish stain of iron and manganese oxides on rock surfaces. As the name implies, desert varnish is best developed, or at least most conspicuous, in arid or semiarid regions; but similar staining also occurs in humid regions—in northeastern United States, in tropical rain forests, at high altitudes in the Alps (*1*), and on tunnel walls in the southeastern United States. Glacial and periglacial boulders at alpine levels in the Rocky Mountains commonly are stained.

The stain occurs on nearly all kinds of rocks—glassy, volcanic, and granular plutonic rocks ranging in composition from granitic to basaltic, sandstone, dense chert, and, more rarely, bull quartz. It is less common on limestone than on the less calcareous rocks.

The varnish may coat isolated bodies or the exposed and now dry surfaces of pebbles or cobbles forming a desert pavement. It may coat vertical or overhanging cliffs, or rock surfaces that are splashed by rivers or wetted by springs or seeps. It may develop on surfaces that are dark or poorly lighted, such as tunnel walls or joint planes. The coatings on joint surfaces or other slightly opened planes of parting in the rocks grade into vein deposits.

Although the stain appears to be composed largely of iron and manganese oxides, the proportions of these must vary greatly from place to place. Certainly the color and luster vary, although they are controlled in part by the fineness of the grain of the rock that is coated and in part by wind polish.

Such widespread deposits in such heterogeneous environments assuredly have heterogeneous origins. At some places, the stain appears to have been transported a considerable distance to the surface that is coated; at other places the coating seems to have been derived from weathering of minerals in the rock beneath it. Some stain assuredly was deposited by physical-chemical processes, but other staining appears to have been deposited biochemically. Either process, however, requires active moisture. In southwestern United States, the desert varnish seems to be in large part the product of past pluvial climates.

The conspicuous deposits of desert varnish on the Colorado Plateaus today are being eroded. On the cliffs, the varnish is preserved on smooth flat cliff faces or beneath overhanging ledges, but it has been largely removed from the rounded edges of joint blocks and from the more exposed upward-facing parts of the sandstone cliffs or buttes. Recent rock falls from the cliffs leave bright scars on surfaces otherwise darkened with varnish. Varnish still coats protected parts of isolated boulders, but it has been removed from their weathered rounded edges. Moreover, the conspicuous and extensive deposits are associated with a topographic unconformity that reflects a past climatic change. It seems clear that the conspicuous deposits of varnish in the Colorado Plateaus have a respectable antiquity and are the product of a past epoch.

The deposits of varnish that are forming today are restricted to places that are wetted frequently. Boulders lying between the high- and low-water stages of the Colorado River, for example, are stained; so are the sandstone cliffs where they are moistened by seeps. Such deposits suggest that the moisture requirements for deposition of desert varnish are considerable.

Archeological evidence indicates that the principal deposits of varnish on the Colorado Plateaus were formed prior to introduction of pottery. The masonry dwellings of the pottery-making Anasazai and related peoples are stained but little. Their petroglyphs were pecked into deeply stained rock surfaces, but the pecked figures, for the most part, remain fresh.

Locally, however, two generations of petroglyphs occur on the same cliff face, and the older may be stained. In southeastern Utah, the older set of petroglyphs commonly includes the square-shouldered conventionalized human figure of geometric outline that is believed to date from pre-pottery or earliest pottery times (*2, 3*).

At such places, the exact dates remain uncertain, but the chronology is clear. First, there occurred extensive deposition of desert varnish, and this predated an occupation that may predate pottery. This occupation was followed by deposition of more varnish, and this deposition was followed by the occupation known as Developmental Pueblo—A.D. 500 to 900.

The younger varnish that formed during the interval between the occupations was deposited about the same time as one of the alluvial formations in the Colorado Plateaus. Presumably this was a pluvial period more or less at the beginning of the Christian Era. The older varnish may be as old as late Wisconsin in age.

It is suggested, therefore, that the principal deposits of varnish on the Colorado Plateaus were formed during the wet periods, and as such they can be useful in deciphering the stratigraphy of late Pleistocene and Recent deposits and events.

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Growth, Food Utilization, and Thyroid Activity in the Albino Rat as a Function of Extra Handling

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In an earlier paper (*1*) we reported, as has Weininger (*2*) more recently, that albino rats that were given extra handling by the experimenter showed significantly greater weight gains than animals that were unhandled or were handled only for routine experimental procedures. From the findings of these earlier studies, it could not be determined whether the differences in weight gains were due to better physiological use of the food consumed or to greater quantities of food consumed. The present study, suggested by Benjamin, is one of a series of attempts to resolve this question and to make preliminary explorations into the mechanisms whereby these physiological differences are mediated.

In our first experiment, 42 weanling male albino rats of the Denver University strain were obtained in nine litters. Using a table of random numbers, the animals were assigned to an extrahandled and an unhandled group in such a manner that both groups had the same number of rats from any one litter. The animals were housed in individual cages with wire mesh bottoms and sides. Purina food pellets and water were supplied *ad libitum,* and equal quantities of fresh lettuce and vitamin supplements were given each rat once each week. To minimize any temperature or environmental differences between the location of the cages on the rack, both the cages and the rack were rotated once each week. The extrahandled animals were removed from their cages for a period of 10 min each day and were individually petted. The unhandled animals were never touched during this period. Semiweekly records were kept of the animals' growth, food consumption, water consumption, fecal pellet excretion, and general state of activity.

At the end of the 5-wk experimental period, the animals were injected intraperitoneally with 50 μc of I^{131} and 24 hr later were sacrificed with chloroform anesthesia. Each rat was suspended from a ringstand by its tail, and a measurement was made from the tip of the nose to the anus for carcass length. The thyroids were removed intact and still fastened to a very small portion of trachea, for radioactive assay. Various organs, such as the liver, kidney, and spleen, were wet weighed, and finally, the whole carcass, except for the tail, was ground in a meat grinder until a homogeneous sample resulted. Samples of these whole carcasses were then weighed carefully and assayed for moisture, fat, and protein.

Our data indicate that there was no statistical significance between the amounts of food eaten by the two groups; nevertheless, the animals in the extrahandled group showed a mean weight gain of 122.8 g compared with 108.1 g for animals in the unhandled group, a difference significant at the .001 level of confidence, and substantiating our findings in previous pilot studies. The ratio of grams food consumed per gram weight gain averaged 4.82 for the extrahandled animals and 5.49 for the unhandled, the difference being significant at the .001 level of confidence.

It appears, then, that we have evidence of better growth and utilization of food by the extrahandled animals. Growth, in this instance, bears the connotation of greater over-all increase in carcass weight, including a larger skeleton. Carcass analysis indicated that both groups of animals exhibited approximately the same percentages of fat and moisture on a 100 g of body weight basis and that the extrahandled rats had, indeed, grown more than the unhandled animals. No significant differences were observed between the weights of kidneys, livers, or spleens.

In addition to the grams of food per gram weight gain ratio, there is other evidence of superior food utilization by the extrahandled animals. The unhandled animals excreted a mean of 3017 fecal pellets, while the extrahandled animals excreted a mean of