Passion regimented; curiosity regimented; endeavor regimented;
Culture, and grace, and all the things I cared for
Equally divided among the mob, and sauced to their taste!

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PROPOSED CHEMICAL MECHANISMS FOR THE PRODUCTION OF SKIN ERYTHEMA AND PIGMENTATION BY RADIANT ENERGY

IN 1927 Lewis[1] made the suggestion that the skin erythema produced by various physical agents, including radiant energy, was due to the liberation or formation of some histamine-like compound which he called the H-substance. About this same time Harris[2] found that alcoholic extracts of skin contained a substance with the pharmacological properties of histamine. As this substance appeared in the tissue spaces, it apparently disappeared from the tissue cells. The following year Ellinger[3] began his attack on the problem by irradiating histidine with the rays from a quartz-mercury lamp. This procedure resulted in the production of an active substance which Ellinger considered to be histamine. It was reported in these papers that the active substance was formed by the physiologically active rays (290 to 320 millimicrons) as rapidly as by the shorter rays, provided the total energy were maintained constant. The very interesting experiments of Szendrö[4] have since shown that the active compound produced in Ellinger's experiments was not histamine but imidazoleacetaldehyde. The physiological importance of Ellinger's discovery has been questioned by Bourdillon, Gaddum and Jenkins.[5] These workers reported that the production of the active compound by the physiologically active ultra-violet wave-lengths was too slow to account for the production of erythema. It is apparent that more work must be done before the controversy regarding the production of imidazoleacetaldehyde from histidine by means of the near ultra-violet can be settled.

Raper and his co-workers[6] have shown that the enzyme tyrosinase will catalyze the conversion of tyrosine to dopa (3, 4-dihydroxyphenylalanine); dopa is then oxidized, in the presence of the same enzyme, to a red indole derivative which spontaneously changes to melanin. There is as yet, however, no direct proof that this mechanism operates in mammals, since tyrosinase has been isolated only from plants and the lower forms of animal life. Bloch[7] has demonstrated the presence of an enzyme, dopa oxidase, in the melanoblasts of the skin. This enzyme catalyzes the conversion of dopa to melanin, but it has no action on tyrosine. In experiments, which will be published in complete form shortly, the author has found that tyrosine is converted to dopa by ultra-violet light. This reaction will occur even if the tyrosine solution is separated from the light source by means of a thin glass filter, although it is slower under these conditions. As might be expected, dopa can be produced by this method only in the presence of oxygen. Changes in the ultra-violet absorption spectra of irradiated proteins have led to the suggestion that dopa may be formed from tyrosine even when the latter is combined in the protein molecule,[8] but this hypothesis has not yet been tested directly. This work suggests that skin pigmentation produced by radiant energy is the direct result of the conversion of tyrosine to dopa, the latter being converted to melanin by dopa oxidase.

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A MICROBIOLOGICAL TEST FOR CARCINOGENIC HYDROCARBONS

WITHIN recent years the researches of various groups have definitely shown that certain synthetic hydrocarbons are capable of inducing cancerous growths in mice. In the attempt to extend these findings, new syntheses have been made in order to obtain a better understanding of the chemistry of carcinomas.

Since the carcinogenic hydrocarbons bring about such marked changes in tissue cells, it was hypothesized that they might also cause marked physiological changes in unicellular organisms. Using a bacterium, *Escherichia communior,* and a simple synthetic culture medium, direct total counts of the numbers of organisms per unit time indicate that certain carcinogenic hydrocarbons accelerate the rate of reproduction of the test organism. Typical growth curves with 1,2,5,6 dibenzanthracene and with methylcholanthrene show approximately 50 per cent. more organisms in the eighth to ninth hour of growth than control cultures.

With phenanthrene, a non-carcinogenic hydrocarbon, repeated tests showed curves identical with the controls. If these results may be taken as presumptive evidence of a correlation between carcinogenicity and stimulation of bacterial growth, it seems possible that if an extension of this study to other hydrocarbons shows such a correlation to be general, a short microbiological test for carcinogenic hydrocarbons may replace the tedious methods available at present.

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4 P. Szendrö, *Pflüger's Arch.,* 228: 743, 1931.
5 R. B. Bourdillon, J. H. Gaddum and R. G. C. Jenkins, *Proc. Roy. Soc. London,* B, 106: 388, 1930.
6 H. S. Raper, *Physiol. Rev.,* 8: 253, 1928.
7 B. Bloch, *Zeits. physiol. Chem.,* 98: 226, 1917.
8 L. E. Arnow, *Jour. Biol. Chem.,* 110: 43, 1935.

This work has been made possible by the active cooperation of Dr. D. B. Clapp, of the research laboratories of organic chemistry at this institute, who has synthesized and purified two of the three hydrocarbons used and has prepared their colloidal solutions. If extended investigations in this field justify the promise shown by these preliminary results it is planned to present a joint paper dealing with the details of preparation and microbiological test.

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DROUGHT AND THE FUNGOUS FLORA OF COLORADO

LAST summer, there appeared in this journal[1] some notes on the recovery of the fungous flora of Colorado following the drought of 1930–1934. In general, during the summer of 1935, there was an adequate amount of moisture, but the fungous flora was sparse and some species were conspicuously absent.

The summer of 1936 was likewise moist and represented the second successive season of normal precipitation following the four-year drought. However, some species of fungi that were abundant in predrought years of normal precipitation have not yet been found. In seasons prior to 1930, fruiting bodies of *Polyporus Schweinitzii, Trametes subrosea, Fomes roseus* and *F. nigrolimitatus* were of frequent occurrence, but during the drought these species could not be found nor have they been found since the drought was broken in 1935. Other species, as *Polyporus ursinus, P. alboluteus* and *Trametes odorata,* that were also abundant prior to 1930, were not found in 1935 but were of rare occurrence in 1936. In general, the fruiting bodies of all pore-fungi were less abundant during the summer of 1936 than in any season prior to the drought, but slightly more abundant than in the summer of 1935.

On the other hand, the gill-fungi made a good showing in 1935, and apparently reached their pre-drought abundance in 1936. Species of the genus *Cortinarius* recovered first and were abundant in 1935; other genera of agarics were either less well represented or else absent. In 1936, a more normal flora of agarics was found with species in the various genera characteristic of the pre-drought period. Then, too, the operculate cup-fungi were rare in 1935 and more abundant in 1936 than in any of the past twelve seasons. This abundance apparently can not be answered in terms of moisture relations, but possibly the preceding dry years is a factor of some consideration.

[1] SCIENCE, 84: 155, 1936.

The slowness of the reestablishment process of pore-fungi is of interest in view of the apparent rapidity of this process in some other families of fungi.

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AGAIN FLYING FISHES

THE question as to whether any fishes actually fly is always before us, and just now the weight of evidence seems to be against the idea of true flight. However, on a trip taken recently on Pacific waters largely for the purpose of observing animal adaptation and behavior, certain observations were made that may well be worth the setting forth. This is especially true, since the facts observed tend to show that there is, indeed, true flight among certain of the fishes. Here are the observations:

The course was not a trajectory, but flat.
The angle of emergence, probably 5° to 7°.
There was apparently uniform speed.
The fishes turned in their flight.
The wings seemed to flutter.
There was flight in both calm and rough weather.
There was a distinct runway in the take-off.

One of the most interesting features in connection with the flight of the fishes was the appearance of a runway in the take-off, *i.e.,* a region of disturbed water before the creature had cleared the surface. This was not like the wake of a boat, nor like the ruffled water behind an aeroplane taking off; it was rather a series of dots in two parallel rows, thus: : : : : : : and was undoubtedly made by the tips of the fluttering wings before the fish had completely cleared the surface.

When a certain height was attained in the take-off the wing tips no longer touched the water, and the smooth surface was unbroken. Moreover, the length of this runway, as it appeared on the quiet water, was such as to show that the angle of emergence was low, probably not more than five to seven degrees.

Coming out of the water at a low angle, the fishes continued on a flat line, at little distance only above the surface. So low were they indeed in their flying that some were observed to cut through waves that chanced to rise across the line of flight. Undoubtedly, the fishes flew not only on windy days but also in calm weather, too, when there could have been no possible assistance from air currents, when the water was as "smooth as glass."

After a fish had cleared the water it continued in its flight for something like ten seconds, covering a distance on the order of fifty yards. During that time a slight turn of some twenty degrees or so might be made to the left or to the right, and in each case the flight continued at what appeared to be uniform speed. Sometimes a short flight might be renewed.