mixed before serving, and is served fresh daily, the settling out of the calcium carbonate is still a very likely occurrence.

To avoid the settling out of the $CaCo_3$ and NaCl from diet No. 3,143 I have been in the habit of melting the gelatine it contains, in warm water (60 cc to every 15 grams of gelatine), incorporating the remaining constituents of the diet in this solution and stirring thoroughly until the mixture is a solid jelly. This insures the maintenance of the even distribution of the soluble and insoluble ingredients of the diet and keeps the ratio of Ca: P quite constant. A weighed portion of the jelly is served to the animal, and the residue is weighed after an interval of 24 hours to determine the amount consumed. It is easier to do this when the food is served in this form rather than in the form of a dry granular mixture, because the residue is in the form of one or a few dry masses which do not fall through the wire floor of the cage and can be easily separated from the feces. This form of diet No. 3,143 is eaten greedily by young rats and they develop a remarkably uniform degree of severe rickets in the usual period of four weeks.

Recently Shohl and Brown,[4] working with diet No. 2,965, modified by the addition of calcium or phosphorus compounds, so that the ratio of Ca to P was varied in a number of ways, obtained rather unexpectedly irregular results. Upon the assumption that the cause may have been the inconstancy of the various ratios of Ca: P, they have adopted the above method of maintaining them constant. They have effected this by replacing 6 per cent. of the corn in diet No. 2,965 by gelatine, and by incorporating the other ingredients in the jelly, as outlined above for diet No. 3,143.

It is not claimed that the results of Harris and Bunker[1] are accounted for by any of the explanations given above, but it seems timely to draw attention to some of the other possible explanations of the occasional irregular results obtained with rickets-producing diets served in the usual form of dry, granular mixtures, and to indicate a way of avoiding one of the causes.

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VIABILITY AND RETENTION OF VIRULENCE OF A CULTURE OF CORYNEBACTERIUM DIPHTHERIAE

IN December, 1928, a pure culture of *C. diphtheriae* was isolated from the throat of a patient. It fermented glucose and gave a typical virulence test in guinea pigs. The culture was grown on chocolate agar, placed in the refrigerator at the time of maximum growth, and transplanted every two weeks until June, 1929. At that time generous loopfuls of culture, each mixed with a drop of sterile rabbit's blood, were placed on each of a number of small bits of sterile filter paper, transferred to sterile Wassermann tubes, and kept *in vacuo* in anaerobic jars (Smillie) for a period of three months. The anaerobic jars were kept in an electric refrigerator.

In October, 1929, the culture was removed from the anaerobic jar, grown in meat infusion broth for twenty-four hours, and then planted on chocolate agar. It grew well, fermented glucose, and again gave a positive virulence test in guinea pigs. The culture was kept *in vacuo* for a second period of three months in the summer of 1930 and, when used for class work in December last, appeared to have undergone no loss of virulence.

It is known that *C. diphtheriae* survives preservation *in vacuo* after the method of Brown,[1,2] but it may be of interest to teachers to know that the culture will remain virulent under such simple conditions as those described.

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FORMALIN POISONING

FEW laboratory workers in the biological sciences have escaped some disagreeable experience with formalin. I know one pathologist who always wears gloves to hide the condition of his skin and another who should if he valued appearances. His hands are swollen, discolored and cracked. (Since I first wrote this he has gone into the hospital with a severe infection that started in these sores.) When I last saw my former anatomy professor he had both hands bandaged for formalin sores. I never heard that sinus or lung trouble had been traced directly to inhaling the fumes, but in some cases they are very irritating to the mucous membrane.

One of the worst features of formalin is the insidious and cumulative nature of the trouble it causes. A person may use it for a year or more before any symptoms appear; then the skin of the hands begins to dry, harden and form painful cracks that heal very slowly. Sometimes suppuration starts under the nails. After the victim has once become susceptible he generally has the trouble with him as long as he has anything to do with formalin. Rubber gloves give only partial protection, for a very slight exposure is enough to start trouble.

Formalin is such a useful laboratory reagent that it is almost impossible to avoid some contact with it. Aside from alcohol and water it probably has more uses than any other fluid.

[4] A. T. Shohl and H. B. Brown (unpublished).

[1] J. H. Brown, *Abs. Bact.*, 9, No. 1, 1925.
[2] *Ibid.*, SCIENCE, 64: 429, 1926.

When I asked a dermatologist if he knew any antidote or remedy he replied: "No, it is a good deal like a hot stove; you must keep your fingers off if you don't want them burned." I have tried ammonia, glycerine and various oils and lotions on my hands with only slight relief.

The purpose of this article is to appeal to the pharmacologists for a remedy; or still better to the organic chemists for some substitute, with which at a reasonable cost we may preserve our dogfish, kill and fix tissues, fumigate sick rooms, disinfect seed grain, poison the flies, etc., etc., while avoiding the irritating properties of formalin.

PHILIP H. POPE

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BASKING SHARKS ON THE PACIFIC COAST

THE staff of this station were interested in Mr. Gudger's account of the capture of a basking shark, *Cetorhinus maximus,* taken on the New Jersey coast near Long Branch, an account of which appeared in SCIENCE of October 3, 1930. We were interested not because of the strangeness of such a catch, but because so much space was given to an animal which is so common with us that we may see one almost any day during December and January.

Twenty-one of these sharks were sold to the Monterey Fish By-Products Plant, of Seaside, Monterey County, California, between the dates of November 22, 1930, and February 13, 1931, the average weight being 2,523 pounds. The largest was 6,580 pounds and 28 feet long, the smallest 900 pounds and 15 feet long. The largest shark sold to the above firm at any time was a few inches under thirty feet and weighed 8,600 pounds. The liver of this shark weighed 1,800 pounds, 60 per cent. of which was oil.

Because this fish feeds directly upon plankton, the oil is clear, odorless and tasteless when carefully prepared; and, in the writer's home, has been substituted for commercial cod-liver oil purchased at drug stores.

Little is known regarding the migrations of this shark on the Pacific Coast; in fact, little is known about it at all. It is a cold water form (which would be obvious because of its use of plankton for food), but it has been seen in numbers at different times of the year as far south as San Simeon Bay, California, and there are records of its having been taken at both San Pedro and San Diego. A 2,000 pound specimen was taken here at Monterey Bay, May 19, last year; and another, 26 feet long, 6,200 pounds, September, 1928; so apparently they occur all the year, but are most plentiful during December and January.

The reasons more of these sharks are not taken are that the price paid fishermen is only $2.50 per ton, and the animals are so difficult to handle that fishing crews do not feel justified in equipping their boats for taking them.

They are now used entirely for fertilizer or chicken feed, the liver oil being used in the preparation of the latter. No doubt *Cetorhinus* will be taken in increasing numbers when the real value of the oil is appreciated as a substitute for cod-liver oil.

Two parasite copepods, *Anthosoma crassum* and *Denemature producta,* were taken from the 6,200 pound specimen.

G. E. MACGINITIE

HOPKINS MARINE STATION

COLOR

SOME philosophers have discussed the question whether color is exclusively a mental phenomenon or whether it resides in a colored object. In the temporary exhibit of color organized by Dr. I. H. Godlove at the Museum of Science and Industry, New York City, there was exhibited a diagram which should help us to a better understanding of this problem.

The diagram has a red block in the center, a source of light on one side and the eye of an observer on the other. This shows that color, as connected with some definite object, is a complex phenomenon consisting of three elements. If any one of the three is missing there is no color. We have no right to say that the color resides exclusively in the mind, the object or the source of light.

We may well carry the analysis much further and distinguish the following items:

(1) A periodicity in the motion of electrons, atoms and molecules in the source of light. That we may have a red color this periodicity must vary within narrow limits on both sides of 500 000 000 000 000 periods a second.

(2) The passage of this periodicity from the source of light to the object in such a manner that the number of periods a second is accurately conserved, but with wave lengths and velocity dependent on whether it passes through a vacuum, air, water or some other transparent medium.

(3) If the source of light produces other colors than red, the object must absorb these and contain molecules which will respond to the periods of red light and send out in all directions light having only that periodicity.

(4) The passage of this selected periodicity to the eye.

(5) A change in the velocity of light as it passes into the eye of such a character that the light is brought to a focus on the retina.

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