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PAPERS AT THE SAN FRANCISCO MEETING OF THE AMERICAN CHEMICAL SOCIETY

COOPERATION, unity with the rest of the living world, rather than isolation and "rugged individualism," will be the keynote of future progress in chemical science as in all other branches of human activity, Professor W. A. Noyes, veteran chemist of the University of Illinois, told his colleagues at the San Francisco meeting of the American Chemical Society on August 19. The occasion was the presentation to Professor Noyes of the highest honor in the gift of American chemists, the Priestley Medal and Award. Responding, Professor Noyes spoke on "The Way Forward in Chemistry." He invoked the idea of "holism," once popular in medieval theological-philosophical doctrine, to convey the concept of a grand unity emanating from God and taking in the whole world. The same word has latterly been revived by biological philosophers to convey the idea of living animals and plants carrying on their life processes by virtue of being integrated wholes, rather than through the interaction of physiologically separate parts. Professor Noyes proposed a third "holism"—a doctrine of intellectual and social activities based on scientific principles rather than on theological doctrine. "One of the most important characteristics of this method is that the individual endeavors to free himself from all personal and national prejudices," he said. "We recognize the value of such a spirit in dealing with international relations. It is the indispensable foundation for justice in all our affairs. The way forward for chemistry is not that we shall think of it as an isolated branch of science and as independent of the rest of our lives. The days when isolation and 'rugged individualism' were appropriate are passed. We must have instead unselfish cooperation in service for each other. The two outstanding problems to be solved by our generation are the abolition of war and a better distribution of the products of our industries. We have no right to bury ourselves in chemistry and think we are under no obligation to contribute to the solution of these problems. . . . There can be no doubt that the nations of America and of Western Europe are abundantly able to furnish work and a reasonable standard of life for all their people. It is absurd that during the last fifteen years millions of men and women have been unemployed and dependent on 'relief.' We as chemists should contribute our part to the solution of this problem."

VITAMIN E, the fertility vitamin without which female animals can not produce young, appears to be one of the higher alcohols. Evidence to that effect was presented by Drs. H. M. Evans, O. H. Emerson and G. A. Emerson, of the University of California. They made a concentrated extract of the vitamin-containing substance from wheat germs, known to be rich in vitamin E, and then by suitable chemical manipulation produced a crystalline substance so potent that laboratory animals were relieved of their sterility by a single dose of three milligrams—a less-than-pinhead sized bit. Analysis of the substance showed it to be a quite complex higher alcohol, each molecule containing 29 atoms of carbon, 50 atoms of hydrogen and 2 of oxygen. Ordinary ethyl, or grain alcohol, has a much smaller molecule, consisting of 2 atoms of carbon, 6 of hydrogen and 1 of oxygen.

PROFESSOR E. R. NORRIS and Mary Simpson, of the University of Washington, reported on their investigation of the vitamin content of seaweed. Seaweed is used as food in various parts of the earth, they pointed out, and indirectly it serves as a vitamin source for all the fish and other animal life of the sea. It is therefore of practical importance to know that several species of seaweed, including those commonly used as human food, are at least fair sources of the scurvy-preventing vitamin C, and also contain vitamin B.

THE results of research on spinach and rhubarb were presented in a joint paper by Drs. D. K. Tressler and G. L. Mack, of the New York State Agricultural Experiment Station, and Dr. C. G. King, of the University of Pittsburgh. Spinach is not just spinach. When it is raised in upland gardens it contains about 50 per cent. more vitamin C than is found in spinach raised on muck land. Also, how long it has been on the market is a matter of considerable dietetic importance, for when held at ordinary room temperatures it loses half of its vitamin C in three days and practically all of it in a week. This difficulty can be overcome by chilling, however; spinach kept in a good refrigerator showed very little vitamin C loss. Age at harvesting was not found to be much of a factor, nor was there any significant difference in vitamin content between different named varieties of spinach. The vitamin was found practically altogether in the leaves; very little was present in the stems. The vitamin C content of rhubarb was practically constant, regardless of state of maturity. Neither was there any notable difference between the two garden varieties tested.

CHOW MEIN, a stand-by of Oriental restaurants, may be unknown in China, but it is an excellent source of vitamins and a balanced meal in itself, according to Dr. LeRoy S. Weatherby and S. Murray, of the University of Southern California. Five white rats were fed on a diet of chow mein exclusively for six months after weaning. They showed no diet deficiency during the entire period and grew normally, although a trifle more slowly than rats fed on other balanced diets. This slight slowness in growth was probably due to the composition of chow mein, which is 82.63 per cent. moisture, and consequently lacking in solid matter. Other experiments with groups of white rats showed that chow mein is not only rich in vitamins A, B and D, but is also sufficiently supplied with minerals and proteins necessary to health. Five grams of chow mein a day, in addition to a basal

diet, was fed to each rat in several groups. In the first group, it was sufficient to produce a normal growth curve for each rat. A gain of 4.5 grams in weight a week, for eight weeks was recorded for each rat in a second group, together with the disappearance of nervous symptoms present before the test. Complete cure of rickets was effected in four weeks in a third group.

VITAMIN C, preventive of scurvy, may also have an important rôle in the physiology of sex. A hint in this direction was contained in a report presented before the meeting of the American Chemical Society recently, by Drs. David Glick and G. R. Biskind, of Mount Zion Hospital of San Francisco. It is as yet no more than a hint, however; much further research will be required to demonstrate whether or not it actually has such a function. The suggestion arose out of researches, with very delicate microchemical technique, on the distribution of the vitamins in the body's ductless glands. It was found that the vitamin C content of the ovaries increased and diminished with their physiological rhythm. Perhaps of even greater importance was the discovery that vitamin C is stored in highest concentration in the pituitary gland. This gland is a small lump of tissue, situated at the base of the brain. It has been called the "driver gland" because its activities control such a large number of bodily functions. Among its many activities is a strong dominance of the sex glands. The apparatus and methods used by Drs. Glick and Biskind were devised in Copenhagen by two Danish biochemists, Drs. K. Linderstrøm-Lang and Heinz Holter, of the Carlsberg Laboratory. Their work is looked upon as remarkably delicate and accurate by their American colleagues.

PAINFUL sunburn, blistering and burning the skin of normal individuals, can be lessened or prevented by the administration of doses of iron, Dr. Howard L. Eder, of the Santa Barbara Clinic, told the American Chemical Society meeting at San Francisco. Iron therapy will also increase the resistance to sunburn of individuals more than normally susceptible to the sun's ultra-violet rays. By using iron, fair, red-haired individuals, usually chronic sufferers from freckles and blistering, can be made to stand an average exposure. Cases known to be sensitive to sunburn were tested before and after being given the iron treatments. There was a marked increase of ultra-violet ray tolerance after the treatment, as well as improvement in color, appetite and other signs of health. Ruddy, bronzed skin replaced raw, inflamed tissue. Citing clinical cases to demonstrate his point, Dr. Eder said that observations indicate the blood of the human body to be "a parasite, living on other body tissues." If such is the case, the hemoglobin test now in use is not a sure way of learning a person's iron reserve, or signs of anemia, since the blood hemoglobin would maintain itself as long as it could draw upon iron reserves of the other organs of the body to supply its needs. Thus a person may suffer from lack of sufficient iron in the body, and still be able to make a good showing in the hemoglobin test. This might explain some cases having the earmarks of anemia, and yet with no apparent lack of iron in the blood.

X-RAYS, scattering upon striking atmospheric dust, warn of the deadly particles of free silica that make certain industrial jobs extra-hazardous, according to Professor G. L. Clark and D. H. Reynolds, of the University of Illinois. Other dusts make the air thick and produce much discomfort, but the real peril to workmen comes from free or uncombined silica. Methods hitherto in use by public health investigators have been difficult and sometimes not particularly dependable. X-ray scattering or diffraction, however, is claimed to be both more rapid and more sure than any hitherto employed. The method depends on the fact that when a thin beam of x-rays strikes any substance it is diffracted or scattered, and that each substance has its own characteristic "diffraction pattern." The pattern produced by x-rays passing through a mass of silica particles, for instance, can not be duplicated by any other substance.

COFFEE goes stale as it grows old because of the action of oxygen on the aromatic fatty substance in the beans that is responsible for their delicate flavor. It is a process analogous to the spoiling of butter. The only thing you can do about it is be sure you get freshly roasted coffee. These results were reported by Dr. Robert O. Bengis, of Yale University. Experimental procedure followed by Dr. Bengis was basically simple. He extracted the fatty substance from a lot of freshly roasted coffee beans, and later on made a similar extraction from beans out of the same batch, when they had gone stale. Each sample of the extracted substance he exposed to oxygen, in an apparatus that would show how much of the gas the sample absorbed. The fresh material absorbed more than did the extract from the stale coffee, showing that the latter had already taken up a measurable quantity of oxygen, during the process of staling. Similar tests on coffee marketed in vacuum tins showed that this method of packing affords only partial protection to the coffee. Even with the best of commercial vacuums, there seems to be some air left—enough, at any rate, to start oxidation in the aromatic fatty substance. Vacuum packing therefore, in Dr. Bengis' opinion, serves only to retard the staling process and will not stop it altogether.

THE discovery of a source of sugar in dahlias, claimed to be commercially practicable, was reported by Dr. LeRoy S. Weatherby and Dr. Wray M. Rieger, of the University of Southern California. Levulose, the kind of sugar which can be made from dahlias, is nearly twice as sweet as the ordinary cane or beet sugar. It will therefore give people who wish to reduce or remain slim the same sweetness with less weight-adding calories, and save money while doing it. Also, since doctors believe flower or fruit sugar to be oxidized more easily than any other kind, its commercial production may bring relief to many sufferers from diabetes. That sugar can be obtained from dahlias and other fleshy-rooted flowers has been known for some time. Some years ago, chemists of the National Bureau of Standards worked out a process for making inulin from the roots of the Jerusalem artichoke, a kind of sunflower. Dahlias and sunflowers are members of the same plant family. Two different processes have

been worked out for the making of dahlia sugar. In one, the juice of the heated dahlia roots is extracted with a large hydraulic press, and the inulin or "dahlia-starch" contained in the juice converted to sugar syrup. In the other, the inulin is converted into sugar within the tubers or roots, and then extracted by means of diffusion batteries, as is done in the manufacture of beet sugar. This process may have a special commercial value because of its adaptability to use in beet sugar factories already built, which now waste large amounts of valuable plant space during the idle season. Dahlias have approximately the same yield of roots to the acre as sugar beets when properly cultivated. California is well suited for the production of dahlia sugar because of the abundance of dahlias in gardens of the state. One dahlia garden now has seventeen acres under cultivation, and others could easily be grown on short notice.

COOL homes in hot summers may result from a process that makes ice out of live steam in a fraction of a second. In its present stage of experimental development the process is still too costly for practical use, but engineers are working hard to perfect it mechanically and also to make it economically feasible. The vacuum refrigeration process was described by D. H. Jackson, of the Croll-Reynolds Company, New York, one of several firms now carrying on research in this field. In producing the high vacuum necessary to obtain the low temperatures, steam is forced through small jets at velocities as high as 4,000 feet a second—nearly twice the speed of an army rifle bullet. Although the jets are only a few inches long, the temperatures drop so rapidly that ice crystals actually form in them, and icicles hang from their ends. At first, high-pressure boilers were necessary for the production of the steam, but lately progress has been made toward the use of low-pressure boilers of the domestic heating-plant type. If their use can be made fully practicable, it may well be that fires will be kept up under home boilers in summer as well as in winter, the steam being used for the formation of ice, and the latter in its turn cooling water to circulate through radiators of modified design, thus accomplishing house cooling with use of heating equipment and doing away with the necessity for installing costly and bulky air ducts. Experiments are also being made with the vacuum cooling of milk, both in the pre-pasteurizing and post-pasteurizing stages. One of the advantages already discernible is a reduction of the amount of water in the milk, thus raising the proportions of butter-fat and dissolved food substances.

PLYWOOD panels, long popular for use in indoor finishing in houses, which can now be used for out of doors, were described by L. A. Sontag and A. J. Norton, industrial chemists of North Tonawanda, N. Y. Plywood is a sort of wooden "club sandwich," made by gluing together three or more thin layers of wood cut with a veneer knife. It is light and strong, and has been found an excellent material for various kinds of light construction work. But since the glue is water-soluble and also subject to the attacks of fungi, termites and other destroying agencies, plywood has never been much used where the weather can get at it. This is all changed now. A new type of glue, known as phenolic resin, is proof against both weather and fungi, and resists the attack of termites. Hitherto it has not been possible to use phenolic resin glues, principally because heat as well as pressure had to be applied to make them work. Now, however, hot presses are available in sizes suitable for making large sheets of plywood, so that manufacture of the new style can proceed.

ZINC and paint are chemically hostile to each other and that is why the average householder finds it so difficult and expensive to keep his zinc-coated eavetroughs decently painted up. Dr. Henry J. Wing, chemist at the works of E. I. du Pont de Nemours and Company, Wilmington, Del., reported an investigation in which he started with the commonly observed fact that paint flaking off zinc-coated metal is covered on its contact side with a white film. Then he made the purest and smoothest zinc surface possible, by coating small pieces of glass on one side with zinc in the same way that aluminum is used to form reflectors for modern astronomical telescopes. These he exposed to fumes from ordinary paint. The same white stuff formed on the mirror surfaces. Upon analysis this was found to be zinc formate, a compound of zinc and formic acid. Analysis of the white stuff from "natural" paint flakes off the surface of galvanized iron showed the same substance to be present. Paint removed from plain iron did not have it. This solved the riddles, but the answer has not yet been forthcoming. Before paint chemists can know how to make paint stick to zinc further research will be necessary.

RECOVERY of gold from solutions where it is present in as small amounts as one part in four billion was reported by Dr. William E. Caldwell, of Oregon State College. Describing his process and its possibilities, Dr. Caldwell said that it makes possible rapid and accurate recovery of better than 95 per cent. of the gold in solution, and will be useful in removing gold from ores with a low percentage of gold content. Since tests indicated that it was possible to recover up to 1/3,000,000 of an ounce of gold from 10.5 gallons of water, or one part in four billion, it was decided to apply the process to sea water. Accordingly samples were pumped from Puget Sound and yielded from 1/1,500,000 to 1/250,000 of an ounce for each metric ton of water. In other words, there is less than a tenth of a cent's worth of gold at the present market value in each ton of sea water. While the new process has proved its ability to extract gold from sea water, no claim is made that it can do so on a paying basis. In the process, mercuric chloride and other chemicals are added to the solution containing gold, forming a precipitate which settles to the bottom where filtering, siphoning or other methods can recover it. Addition of lead and heating cause a minute gold bead to form. The same method can be used to recover silver dissolved or suspended in minute quantities in solutions, although with not quite as high degree of accuracy.