Letters to the Editor

An Experimental Compressed-Air Plant Sprayer

While investigating the commercial possibilities of hydroponics in Aruba, N. W. I., special circumstances made it necessary to develop better plant-spraying equipment for insect control. During the past year and a half a compressed-air spraying unit has therefore been developed. This technic is based upon the well-known, compressed-air, paint spray equipment.

Air under pressure may be supplied either by an air compressor or by cylinders of compressed air, depending upon the requirements of the garden unit. The average operating pressure used is 100 pounds per square inch, the range being between 90 and 125 pounds.

The insecticide container must be constructed with sufficient strength to operate at a maximum operating air pressure of 125 pounds per square inch. The body of the Aruba unit is an 18-inch piece of heavy steel pipe 8 inches in diameter. Heavy steel caps are welded to each end, making the entire length 26 inches, with a 5-gallon capacity. Two-inch threaded nipples are welded to the top of the cylinder to receive the brass filling plug, the brass plug containing the air, and the spray piping assembly. Rubber washers are inserted under these brass plugs to insure an airtight fit. Smaller threaded nipples are welded to the body of the container to receive the ½-inch drain valve and the pressure gauge. Castors are attached to a suitable framework, and a handle is provided to enable the operator to move the equipment readily.

All fittings are of ¼-inch size except the drain valve, which is ½ inch in size. All valves and external piping should be of steel construction for safety. A pressure-release valve is necessary to release the air pressure when refilling the unit which, for safety reasons, is attached to the filling plug.

The spray fluid pipe outlet contains a valve which shuts off the spray supply to the spray nozzle. A ¼-inch copper connecting tube inside the unit reaches to within ¼ inch of the bottom of the container. The spray fluid is forced through this tube from the container.

The air-line intake supplies air to both the container and the spray nozzle. A valve may be used to regulate the air pressure into the container. A copper tube extension of the air line into the container may or may not be installed. For completely dispersible contacticides no agitation of the spray is necessary in the container. Agitation should be provided when less stable sprays are used. Operating experience indicated that when an agitation tube is used it should terminate some distance (at least 6–12 inches) from the fluid outlet. At least for stable contacticides, the air pressures direct to the spray gun and into the spray container are equal.

Another valve on the air line controls the air supply to the spray nozzle. Heavy-walled rubber tubing, usually ¼-inch oxygen or paint hose, is used to convey the air from the source to the container and from the container to the spray nozzle. A similar hose also conveys the spray fluid from the container to the spray nozzle. The two hoses to the spray nozzle are taped together to facilitate handling. Special adaptor nipples are used to connect the hose couplings to the container piping.

The spray nozzle is the important feature of the type of equipment. In fact, the operating principle of the usual paint spray gun is the chief reason why this type of sprayer is superior to the usual agricultural sprayer. Any type of paint spray gun, suitable for high-pressure operation, is satisfactory. A De Vilbiss, Type MBC, paint spray gun works well. The fluid and the air adjustment valves are set to provide a finely divided spray.

A diagram of the unit is available upon request to the writer.

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Projection of Meteor Trails on the Moon

In a recent issue of *Science* (1946, **104**, 146) there appeared a letter from N. J. Giddings, of the Bureau of Plant Industry, Soils and Agricultural Engineering, Riverside, California, relative to a remarkable chance observation made by him regarding the moon on 17 June 1931. The phenomenon was also witnessed by Mrs. Giddings.

This letter is referred to in the October issue of *Sky and Telescope* in Dr. Marshall's column, "Astronomical Anecdotes," and the suggestion is made that meteorites striking the moon might produce a flash visible on the dark side which might be seen with the naked eye. It seems to me that a more probable explanation is the following:

According to Mr. Giddings' letter, the time of observation was approximately 7: 40 P.M. (P.S.T.?). Allowing for some small error in timing, it is clear that the sun could not have been below his horizon for, say, more than 25 minutes. The sky, therefore, must have been quite bright in the west, the direction in which the moon was seen, Mr. Giddings having stated that it was "new." I take it that the probable age was three or four days, since it is at this time that the dark side is most prominent. Now, suppose that at this time several meteors were entering the earth's atmosphere. Unless these were very bright, it is not likely that they would be seen against the bright twilight sky. But, should their trails cross the *dark* surface of the moon, they would be visible for just that portion of their path which had the dark side as its background. Thus, Mr. Giddings would be confirmed in his statement that the flashes were "definitely within the limits of the moon's outline." It is to be noted further that these flashes "streaked across the moon." This is how a meteor trail would appear,

projected against the dark side; but a meteorite impact on the moon itself would certainly appear, if at all, as a momentary pinpoint of light. I think that Mr. Giddings had the rare fortune to see several meteor trails projected against the dark side of the young moon, and that such is the simple explanation of this phenomenon. It seems strange indeed that such an unusual observation should have been "courteously discounted" apparently without any thought whatever being given to the matter, and *Science* is to be congratulated in calling attention to these observations.

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Whole-Blood Cholinesterase Determinations in Some Hematologic Dyscrasias; Low Cholinesterase Values in the Leucoses

The asthenia and extreme pallor attending the acute malignant leucoblastoses (leucoses) are considered to be, as in the comparable case of shock (*O. St. med. J.*, 1943, 39, 907; 1944, 40, 130; 1945, 41, 1107), manifestations of profound cholinergic intoxication. Death is the culmination of this intoxication, which operates to produce an irreversible shock state characterized by the atopic-exudative syndrome of thrombocytopenic purpura. The last phase is usually not accounted for on the basis of myelophthisis or leucoblastic infiltration.

Whole-blood cholinesterase determinations have been made in 14 leukemic patients from military hospitals to determine a possible basis for the cholinergic state. The series included five cases of acute and two of subacute myeloblastosis, one of acute monoblastosis, one of acute lymphoblastosis, four of chronic leukemic myeloblastosis, and one of chronic lymphatic leukemia. The blood cholinesterase values in leucoses were compared with those obtained in 18 patients with nonleukemic hematologic conditions, the latter series incorporating three instances of macrocytic and three of hypochromic anemia, three of polycythemia vera, one of eosinophilia of undetermined origin, one of idiopathic hypoprothrombinemia, and seven of benign systemic lymphosis (infectious mononucleosis).

In 13 of the 14 cases of malignant leucoblastosis, the blood cholinesterase was lowered to a degree proportional to the acuity and clinical severity. The exceptional case was that of stationary chronic lymphatic leukemia.

In the nonleucotic series all cholinesterase values, with four exceptions, were within normal range. In the macrocytic anemias the values were low, confirming the observations of Sabine (*J. clin. Invest.*, 1940, 19, 833). In one case of polycythemia it was elevated.

In neither series did the blood cholinesterase values parallel the erythrocyte or leucocyte counts or the hemoglobin concentrations. A confirmation of the independent variability of these factors was obtained experimentally in one case. By massive infusion of human plasma as a source of cholinesterase, the level of the latter in the blood of a patient with subacute myelogenous leukemia was raised to normal value. During the period when the rise was extant there was abatement of the pallor and the prostration, but erythrocyte and leucocyte counts remained stationary, rising only after discontinuance of plasma administration when the cholinesterase content of the blood began to fall to its preadministration level.

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A Simply Constructed Biophotometer

Through the efforts of the U. S. Government and the American Red Cross, food and medical supplies were transported to prisoners of war and civilian internees in Japan. At our camp in Zentsuji, Shikoku Island, Japan, a limited number of supplies were received, including vitamin concentrates of all types. The diet at this camp, as in the majority of the Japanese POW camps, was inadequate in all respects, and many officer prisoners of war were showing symptoms of various nutritional deficiency diseases. Among these were complaints of night blindness, beriberi, etc. In order to distribute equitably the limited quantity of vitamin supplements to those who needed them most, a biophotometer for measuring minimal visible light was constructed by use of apple crates for framing, and cardboard from the Red Cross parcels for the sides.

The instrument was so constructed that a panel could be put between a light source in the bottom of the instrument and the patient's eye at the other end. In various positions in the panel were letters "E," cut out of the cardboard panel. The first "E" was covered with 1 sheet of tissue paper, the second with 2 sheets, and so on until the twelfth "E" was covered with 12 sheets. Thus, the amount of light from the bulb reaching the patient's eye was graded. Across the other end, through which the patient looked at the panel, were stretched varying numbers of pieces (1 to 8) of blue cellophane.

The 8 sheets of cellophane were placed over the eyepiece, and the number of "E's" that the patient could see was recorded. Then a sheet was removed and the number of "E's" recorded, this number obviously being either the same as with the 8 sheets, or more. This procedure was repeated until the patient could see all "E's."

By performing this test on a number of seemingly normal individuals who were receiving, in addition, vitamin supplements, a normal curve could be obtained by plotting the numbers of letters seen, *i.e.* the minimal visible light, vs. the number of colored cellophane slides. It was found that the total numbers of letters that could be seen by the normals averaged about 97 over the 8 slides (mildly deficient cases of avitaminosis A, about 75 to 90; badly deficient cases, less than 75).

The curves recorded as described above are very similar to those reported in the literature and indicate that such a simple instrument was reliable and could well be used in a clinic with a very small construction cost.

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