AIRGRAPHY OR AEROGRAPHY?

IN the *Bulletin* of the American Meteorological Society (April 1927, p. 69) the suggestion is made that the word *aërography* (study of the air) henceforth should be written *airgraphy*. On this side of the Atlantic we have done away with the word aëroplane (which certain of the Boeotians pronounced a-ery-o-plane) and use the simpler, equally expressive term airplane.

A new reason for adopting the change is found in the increasing use of the word *areographic* by astronomers in connection with planetary atmospheres.

Thus, Professor W. H. Wright, of the Lick Observatory, discussing the ice cap on Mars speaks of "the exact areographic position of every cloud or atmospheric peculiarity."

If we are to continue the use of aerographic and areographic, we offer the types a fine opportunity to do their worst in transposition; to say nothing of professorial orthography!

And, while we are about it, can we not abandon *meteo*graph and *meteo*therm for airgraph and airtherm?

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"ASTRONOMIC"

WHO introduced the word "astronomic" into astronomic literature and why did he do it? "Special Publication No. 110 of the U. S. Coast and Geodetic Survey" is entitled "Astronomic Determinations." Plans have been made for "An Ideal Astronomic Hall" in the American Museum of Natural History, though there is some comfort in the fact that it is "to be devoted to astronomical and kindred subjects . . ." We even find the terms "astronomic latitude" and "astronomic time" in a recently published astronomic text-book. I see no object in lining up the comfortable old word "astronomical" with geocentric, pneumatic, egophonic and gastronomic. If we don't look out, some one will take all the joy out of our new word "astrophysical."

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

DIRECTIONS FOR DETERMINING THE COLLOIDAL MATERIAL OF SOILS BY THE HYDROMETER METHOD

IN the issue of October 8, 1926, of this journal there appeared a brief article proposing the hydrometer method as a very rapid means of determining the colloidal content of soils. Since the publication of this paper a great number of letters have been received asking for more detailed information as to technique, kind of hydrometer used, etc. In view of this large number of inquiries, it has seemed advisable to publish in advance of the main report the directions for executing a colloidal determination and other essential information concerning the method.

The use of the hydrometer method for determining the colloidal content of soils in only fifteen minutes is based upon the fact that there is a remarkably close relationship between the colloidal content of soils as determined by the heat of wetting method and the percentage of material, based on the sample taken, that stays in suspension in a liter of water, at the end of fifteen minutes. There is a fundamental basis for this relationship, for it holds true for all types of soils and various amounts of samples taken. The only soils that do not give a very close relationship are the peats and mucks and this is because it is almost impossible to disperse those organic materials.

The success of the hydrometer method for determining colloids is based upon a complete dispersion of the soil. This can be accomplished remarkably well and most rapidly by means of a stirring motor, such as is used in mixing malted milk. In using this machine, however, care must be taken to use a special cup made purposely with baffles in it in order to prevent the circular motion to which the soil-water mixture is subjected without these baffles. The machine will disperse a soil in ten minutes which an ordinary shaker will require more than twenty-four hours to accomplish.

The soils can be dispersed also by hand from about ten to fifteen minutes, but such dispersion can not be uniform and not always complete and consequently is not recommended. If it is absolutely necessary to disperse by hand, then the following procedure may be followed. Place fifty grams of soil, 100 grams in case of sandy soils, based upon the dried basis in a mortar, add enough distilled water to make a paste and pestle vigorously. Add more water to make a thin suspension, stir, let it stand half a minute and pour supernatant liquid in the cylinder. Pestle the paste again vigorously and again add water to make suspension and at the end of half a minute pour supernatant liquid in the cylinder. Continue this operation until all the clays are dispersed or the liquid is almost clear. To the mixture add 5 cc of 1N KOH. For making hydrometer readings follow directions given below.

If the stirring motor is used, the procedure is as follows: Place fifty grams of dry soil in the cup, in the case of sandy soils 100 grams, add 5 cc of 1N KOH, fill cup with distilled water one and one half inches from the top and stir it by the motor for nine minutes. The mixture is then washed into a cylinder having a total capacity of about 1,130 cc. The hydrometer is placed in the cylinder and the latter is filled clear to the top with the hydrometer still in it in order to facilitate the reading of the hydrometer from the top of the liquid column. The hydrometer is then taken out, and the mixture is stirred vigorously for about a minute, using one palm as a stopper. The cylinder is placed on the table and the time is quickly noted, preferably by a stop watch. The hydrometer is put in the mixture and at the end of fifteen minutes the reading is noted. Just about half a minute before the fifteen-minute period is up, however, the hydrometer is pushed down gently in order to avoid any lagging. The reading, which is grams per liter, is divided by the weight of sample taken, and the result is percentage of colloids in that soil. The temperature of the mixture is also noted and the necessary correction made. All readings must be reduced to 67° F., which is the temperature at which the hydrometer was calibrated. A change of 1° F. makes a difference of about 0.35 per cent. of colloids. For temperatures above 67° F. the corresponding amount is added to the percentage indicated by the hydrometer, and for temperatures below 67 the amount is subtracted.

The hydrometer gives an average measurement of the densities for the entire column of liquid, down to where the solid soil column is formed. To make allowance for the water required to saturate the soil, 1,050 cc of water is added to every fifty grams of soil. A special cylinder is made which, when filled entirely with soil and hydrometer in it, will contain 1,050 of water, and thus the necessity of having to measure the water every time is eliminated. An ordinary 1,000 cc cylinder may also be used by making a mark of the proper volume.

The method may appear empirical, but it really gives quite absolute results. The results it yields are also absolutely comparable for different soils. For instance, the rate of settling of soil particles is governed largely by their size. This being the case, then the amount of material staying in suspension at any given time has about the same average size of particles for the different soils. The hydrometer, when floating, is governed entirely by physical laws without any outside factors entering or any personal element entering into it. Its readings, therefore, are quite accurate.

Since the hydrometer method gives absolutely comparable results for the different soils, and since the results show a very close relationship with the results of the heat of wetting method, it probably means then that the heat of wetting method for determining the colloidal content of soils has been a correct method. Evidently, both methods tend to measure the same thing.

From all our present knowledge, it appears that the hydrometer method can be employed to determine the colloidal content of soils, quite accurately. The method is also very rapid, the colloidal content of more than three soils can be determined in less than one hour, using only one hydrometer.

The hydrometer can also be used to measure the rate of settling of soil particles from which a distributed curve should be worked out.

Referring once more to the dispersing machine there are two things that must be strictly guarded against, the first is that the cup must have the baffles or wires in it, and the second is that the paddle or button on the stirring rod tends to wear out in sandy soils. When it becomes flat it must be replaced, because in the flat condition it loses its stirring efficiency. With these two precautions to watch out for, it can be said that this machine is most wonderful for dispersing soils for any purpose.

The detailed report of this work will appear in *Soil Science* shortly.

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SPECIAL ARTICLES

THE LIFE HISTORY OF TAPEWORMS OF THE GENUS MESOCESTOIDES

THE generic name *Dithyridium* Rudolphi, 1819, has been used by zoologists to designate agamic cestodes having an elongate body and containing an invaginated scolex which bears four suckers but lacks both hooks and a rostellum. These larval parasites have been reported from a variety of mammalian and nonmammalian hosts, in most cases in relation with the body cavity and its membranes and viscera. In one instance they have been reported from the voluntary muscles and the heart. Morphologically these larvæ appear to occupy a position intermediate between those of pseudophyllid and cyclophyllid cestodes, their general body shape resembling that of the former, whereas the scolex is suggestive of a cyclophyllid tapeworm.

Although there has been some speculation as to the relationship of these larvæ to known strobilate tapeworms, no conclusive experimental work designed to elucidate the ultimate development of Dithyridium