Rain-making and Other Weather Vagaries. By W. J. HUMPHREYS, meteorological physicist, United States Weather Bureau. Baltimore, The Williams & Wilkins Company. 150 pages. Price $2.50.

PROFESSOR HUMPHREYS has chosen as an appropriate title "Rain-making." In view of the knock-down, drag-out treatment accorded each and every method proposed, a more fitting title would be "The Improbability of ever making Rain by Human Agencies." But then no publisher would stand for that. A sub-title describes the work very well as a book on weather follies and fancies. Such it is, a most readable and entertaining book upon *pluviculture*. This name we owe to Dr. David Starr Jordan, who used it recently in SCIENCE, when analyzing the mental processes of prevaricating mortals, self-styled rain-producers. The breed infests the doctor's own great golden state—the realm of climate, glorious enough when the rains come in due season.

On the Pacific coast, we have known business men, seemingly sane and level-headed, hand over their tribute of shekels to fakirs claiming to produce rain sufficient to ensure a prosperous season. Now we ourselves are not noted for business acumen, yet it seems to us that a prosperous season would be a trifle more prosperous if shekels given to the undeserving were withheld.

Dr. Humphreys has a keen sense of humor. The book opens with a poem by the distinguished chemist-in-chief of the Geological Survey, Dr. Frank Wigglesworth Clarke. It appeared in *Life* thirty-five years ago; but like its author still retains the sprightliness of youth. It tells of Jones, the rain-maker who started the rain. But he did not know how to stop it. Help came at last.

> To check the flood, you started, I've heard
> All efforts were in vain;
> Until the Bureau at Washington stirred
> And stopped the storm with a single word,
> By just predicting Rain!

The valorous forecaster thus appears in a new light. When after a succession of rainy days the sun breaks forth, and we read the morning forecast—"Rain," we shall understand and appreciate the efforts of a self-sacrificing forecaster at headquarters.

After the geologist's "Rhyme of the Rain Machine," we are treated to ninety pages analyzing the various efforts made to control rain. There are numerous calculations of the amount of energy involved with cost estimates. These last would seem to be prohibitive; and the situation is perhaps best summed up in the words:

> One may do as he likes with a small bit of air entrapped in a bell jar, for instance, but the free atmosphere covering hundreds of square miles, and weighing billions of tons is hopelessly beyond human control.

In explaining droughts in the Valley of California during summer it is stated that because the incoming air is greatly warmed, its relative humidity is so reduced as to render precipitation by convection practically impossible. "If, for instance, the temperature of the lower air is 305° A. (90° F.) and the relative humidity 20 per cent., common conditions in such regions, cloud would not form as a result of convection, below about 3.25 kilometers. Hence a shower from these clouds is improbable; etc." There would be under such conditions about thirty-two grams of water vapor per cubic meter of space when saturated. If only 20 per cent., or six grams, were present, there would still be enough, we think, to condense as clouds, and under unstable conditions result in thunderstorms, if the usual lapse rates prevailed. And we do have, whenever the moisture is present, clouds and occasionally thunderstorms. The fact is, that the lower strata are robbed of their vapor at the upper end of the valley—evidenced in the fogs of the bay section and Lower Sacramento Basins, also the northern reaches of the San Joaquin. We should prefer to treat the aridity of the valley as due to actual removal of vapor at the source by condensation, rather than a loss due to warming and convective removal.

While essentially scientific, the book deals with efforts other than the purely physical or chemical to produce rain. There is much that is informative regarding magical and religious ceremonies.

Part II, of fifty pages, treats of the planets and weather, the moon and the weather, moon farming, key or control days, equinoctial storm, alleged weather omens of fauna and flora and certain miscellaneous follies. This part of the book would do an immense amount of good if widely circulated among the farmers of our country.

Notwithstanding that the Weather Bureau has been functioning for more than half a century and that in many colleges courses in meteorology are given, many minor newspapers publish horoscopes and planetary prognostics; and apparently intend to do so. Space given to such nonsense might be used to better advantage. It therefore is incumbent upon instructors in high schools and academies to interest their young people in the problems connected with cloudy condensation in the free air. No more helpful book than this one of Professor Humphreys's is to be found; and it will prove not only stimulating but extremely convenient in meeting many otherwise puzzling inquiries. The book is well printed, type work, com-

position, proofreading and make-up, all creditable. The publishers, following their usual custom, give the names of all who have contributed skill of hand or brain.

ALEXANDER MCADIE

SCIENTIFIC APPARATUS AND LABORATORY METHODS

CEMENT CASTS OF PETROGLYPHS

CASTS of petroglyphs may be successfully made of cement. I do not recall having seen such casts in museums, although I have frequently visited the largest museums in Canada and the United States. When I suggested trying to reproduce a petroglyph from Kispiox, B. C., in cement an engineer of many years' experience told me that it could not be done without breaking my plaster of Paris mould and producing a cast damaged by numerous air bubbles.

On trying the experiment an ordinary plaster of Paris mould was used and not only the first cast but all three that were tried were satisfactorily successful. These casts were sent one to the Victoria Memorial Museum—the national museum of Canada—at Ottawa; another to the Vancouver museum, and the third to the United States National Museum, Washington.

The well-shellacked mould was soaped liberally and allowed to dry. The cement was mixed, one of cement to two of sifted fine sand, by my foreman, Mr. W. C. Washburn, of Kitwanga, B. C., who flowed it with a spoon from one edge of the mould over the entire surface. When the surface was covered to a depth of about a quarter of an inch wire netting was laid on and covered with cement or in the case of the last cast strips of wire and iron were laid on to form a reinforcing grid. A wire loop was laid in the cement and allowed to project at the back near the upper end of the cast to serve in hanging the cast on a wall.

The next day the cast was easily lifted out of the mould, having shrunk sufficiently to lift more easily than the usual plaster of Paris cast. It might be well to allow the cast to remain in the mould longer to insure safety from being broken in lifting. The result greatly resembled the original rock. Such casts may be painted with diluted oil or water colors or various colored sands and pigments may be used to make them resemble various colored rocks. The texture can be modified, by using coarser sand or mixtures of less cement or less sand, thus making the cast resemble coarser or finer rock. It is possible that other materials than soap may be used to make the cast separate from the mould. But difficulty may be encountered in representing rock of finer texture than pure cement or of color much lighter than cement. It may be more difficult to cast by this process petroglyphs or other archeological objects that are very large or are not as flat as the Kispiox specimen but experiments seem worth trying since the success of the method leads me to advocate cement in place of plaster of Paris for making casts of flat petroglyphs up to four or five square feet in area.

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A SIMPLE DEVICE FOR EXTRACTION AND DIGESTION

THE Erlenmeyer flask is a convenient vessel for digestion of plant materials during their analysis. Although its equilibrium is rather unstable when set in water to any depth, this difficulty is overcome by a ring of lead, "R" as shown in the diagram, attached to the flask by a wire, "W," fastened to the ring at opposite sides and drawn taut under the bottom of the flask. The ring should be equal in weight to the total water displacement of the flask, and as shown in the diagram it should be located well below the normal center of gravity of the vessel. For extraction of substances where boiling temperatures are not permissible, the material can be placed in an ordinary thimble, "T." A piece of copper wire, partly wound into a coil "C" that is slightly larger than the thimble is lowered into the flask by the handle made from the unwound wire. A hook at the upper end of the handle slipped over the lip of the flask will hold the thimble above the liquid in the bottom. The funnel "F" inserted in the neck will serve to deliver the extracting liquid into the thimble, will act as a condenser for any that may evaporate and will keep the thimble upright if the coil is not sufficiently deep. For extractions by intermittent applications, when it is desirable to keep the extract away from the substance in the thimble, this apparatus has proved most satisfactory. Its cheapness and ready convertibility into a digester permits a large number of units to be put into operation at once, and with the coil and thimble removed the weighted flask makes an ideal vessel for sugar determination.

The chief advantages of the ring attachment to the flask when used as either an extractor or a digester lie in the safety and speed with which the flasks may be handled, in its compactness and in the elimination of clamps during all operations. The wire which keeps the ring firmly in place also raises the flask from the bottom of the bath and prevents superheating the material within.

This apparatus is especially useful as the digester