shifting hunting camps replace the populous Pueblo villages? In an attempt to answer this question the writer has visited numerous sites in this and adjacent regions during the past three summers, studying the water supply, soil characteristics, topography and artifacts of each. From the pottery, which is being classified by the system of Dr. Mera of the Laboratory of Anthropology, a relative dating scheme is being developed for the times of settlement and abandonment of each of the sites.

The agricultural sites were of two types; those east of the Pecos River were in the rolling sandy prairie lying between the gypsum steppe, which borders the river, and the dunes of the Mescalero Sands further to the east; while the sites west of the Pecos were all in the alluvial bottoms of the small streams which flow eastward from the mountains. No agricultural sites were found or heard of on either the hard dry steppe or on the alkali flats of the Pecos. In general the sites are in locations which have in recent times been found to be the most suitable for agriculture. The use of deep wells has extended the range of arable land beyond that available to the Indians. Dry farming was practiced by the Pueblos on the sandy prairie, while they probably irrigated their stream bottom sites. It appears likely that the Pueblo people settled the entire region within the space of but a few years, but they abandoned the sandy lands long before they left their irrigated gardens beside the streams.

The abandonment of the sandy land sites was probably caused by the blowing of the soil, rather than by the pressure of nomadic tribes. At every site in the sandy lands there was ample evidence of wind-disturbed soil. Usually the soil was blown up into great dunes. Artifacts were abundant in the blows and part way up the windward sides, but were not to be found on the tops of the dunes. At a few sites the top-soil appeared to have been completely swept away, leaving only hard red barrens. Similar types of wind erosion are to be seen in the vicinity as the result of twentieth century mis-farming practices. Natural reclamation of such disturbed soil is extremely slow. Even though these blown-out fields have lain fallow for more than seven hundred years they are still barren wastes.

The irrigated sites in the valleys on the contrary show no evidence of permanent damage to the soil. Many such sites are now in cultivation, with no apparent signs of decadence. The earliest dwelling sites of the Pueblos along the little streams were on low ground by their gardens. There was no evidence of any regard or precautions for defense at these or the sandy land sites. They occupied these open sites in the Hondo valley somewhat later than the villages on the sands east of the Pecos. This peaceful period came to an end, and the final phase of this culture was when they commenced building pueblos on the high, steep and rocky hills overlooking the Hondo in a manner closely resembling the Piro towns of Gran Quivira and Loma Pelada a hundred miles to the northwest. The final abandonment of the valley sites appears to have been the result of the pressure of the nomadic tribes rather than that of a series of crop failures. There is some evidence that the people were weakened physically, and possibly in numbers, too, by mineral deficiencies in their diet.

These archeological findings are in quite close accord with the present trends of agriculture in this far corner of the Great Plains, thereby giving some confirmation to the theory of Dr. Wedel that archeology can assist in predicting the permanency of agriculture in many regions.

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CELL SHAPE PHENOMENA INTERPRETED IN TERMS OF COMPRESSED LEAD SHOT

THE shape of parenchymatous cells such as those found in the pith of vascular plants is undoubtedly the result of several factors, among which contact and pressure, the plane of cell division, cell elongation and varying adjustments among all these may each play a part.

In an attempt to determine the effect of contact and pressure on the shape of uniform spheres, small lead shot which had been selected for uniformity were used. The shot were poured into a cylinder and compressed at various pressures.[1] In one test sufficient pressure was used to eliminate all the air spaces between the spheres. A study of over five hundred of these compressed balls, omitting the peripheral layer adjacent to the wall of the cylinder, gave an average of 14.17 contacts or faces per ball. In another test somewhat less pressure was used, all the spaces between the spheres were not eliminated, and the average for the hundred balls examined was 12.9 contacts. Still less pressure gave an average of 11.0 contacts for one hundred balls; and slight pressure, just sufficient to cause flattening at the points of contact between adjacent spheres, gave an average of 8.4 contacts for the hundred balls examined.

These results indicate that when lead balls are poured into a cylinder there is an irregular distribution of contacts between spheres, and the "cannon ball" stacking, in which every sphere is in contact with twelve other spheres, does not occur. This irregular

[1] The compressions were made possible through the courtesy of the Civil Engineering Materials Testing Laboratories of Columbia University.

arrangement of contacts is maintained as the number of contacts becomes increased from 8.4 to 14.17, with additional pressure.

Lewis[2] has shown that the cells of the elder pith have an average of fourteen facets, and he emphasizes the orthic tetrakaidecahedron as a possible fundamental shape in such tissues. None of the orthic tetrakaidecahedra of Lord Kelvin, with eight hexagonal and six square faces, were found among the lead balls examined; however, when all the spaces between the shot were eliminated, the average number of contacts was very near fourteen. A less regular tetrakaidecahedron was formed, having in addition to hexagonal and square faces a relatively large number of pentagonal sides. This shows that the regular arrangement of spheres necessary to form the orthic tetrakaidecahedron of Lord Kelvin on compression was not present when the shot were merely poured into the cylinder. It also helps to explain the occurrence of pentagonal faces in the cells of elder pith found by Lewis.

That contact and pressure must be of marked importance in the determination of the number of faces occurring on parenchymatous cells seems obvious from the above experiments. It is further highly probable that the occurrence of intercellular air spaces in parenchymatous and other tissues is correlated with contact and pressure relationships. On the basis of contact and pressure alone, fewer contacts between adjacent cells would be expected in tissues with abundant air spaces.

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HABITAT OF OPHIOSAURUS VENTRALIS

Two specimens of *Ophiosaurus ventralis* were discovered in Cumberland County and one specimen in Buckingham County, Va., in September, 1937. The first two specimens had been killed on the highway by automobiles; the third one was captured and is now in the possession of the farmer who found it in Buckingham County. The distance from the most eastward to the most westward of these finds was about twenty miles. These counties are in Piedmont Virginia, about seventy-five miles north of the North Carolina line and 150 miles west of the Chesapeake Bay.

Since Ditmars places the Northern limit of this reptile in the eastern part of the United States as North Carolina, and Jordan as "to Virginia," it seems that these are the first recorded specimens for this section of the country.

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[2] F. T. Lewis, *Proc. Am. Acad. Arts and Sci.*, 58: 537–552, 1923.

FRESH-WATER MEDUSAE IN VIRGINIA

FOURTEEN miles south of Lynchburg, in Crystal Lake on the James Wamble estate, gonosomes appeared in large numbers about August 5, and have been observed there at frequent intervals to the present (September 29). Vertical migrations of the medusae have been noted, showing no observed correlation with temperature, sunlight, wind or time of day. Sometimes the top meter of water over the greater part of the pond showed jellyfish actively swimming about. As many as 70 fair- to large-sized specimens have been counted in each cubic meter of water on such occasions. On other days, few medusae were seen except in the wake of the boat or where the water had been stirred to some depth by means of a paddle. A few triradiate and quinqueradiate specimens were collected. The average catch (quadriradiate) measured considerably larger than fresh-water medusae hitherto reported, some reaching a diameter of 22 mm. Otherwise the descriptions given for *Craspedacusta ryderi* (Potts) fit well enough. The reflexed, upstretched, long tentacles seem highly characteristic of even small specimens. All appear to be females. Parts of the lake where the depth is greater than two meters are well populated with medusae; between one and two meters they are less common, and in less than one meter of water they are rare. The water temperature at present is about 24° C. The water has a high organic content, and the bottom where shallower than two meters is densely covered with Utricularia. A green Stentor and a Spirostoma were very conspicuous protozoans occurring there in great numbers. The pond is created by an earthen dam which restrains a very small stream, and has been in existence some ten years. The pond was stocked with fingerling bream and black bass two years ago. Eels have been caught there, although the emptying stream is very small and quite shallow. The plant growth was largely cleared out last year. A search for hydroids was unsuccessful.

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SCIENCE AND DEMOCRACY

HAVING read the quotations from the New York *Times* in SCIENCE of Friday, October 22, entitled "Science and Democracy," I could not help but follow the urge to write my views on the subject.

I certainly admit with the author that freedom of thought and expression is in peril. In the totalitarian states the ruling dictators are going to see that this condition continues. But, I do not believe