for its support of this project. Potter's work is being sustained by a grant from the division of environmental studies of the NSF, and to him we are indebted for advice on this paper. To Johs. Iversen special thanks are rendered for his wise and generous counsel.

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San Augustin Plains—the Geologic Setting

The San Augustin Plains occupy a high, intermontane basin on the continental divide in the Datil-Mogollon volcanic plateau of western New Mexico (*1*). Their general features have been described by Bryan (*2*) and Powers (*3*). At present, a playa occupies approximately 35 mi² at the west end of the plains. During the late Pleistocene at least, a maximum area of 255 mi² was occupied by pluvial Lake San Augustin. Postlacustrine erosion and sedimentation have produced only local and minor modifications of the features of the lake.

The highland areas bordering the basin are chiefly erosional remnants, carved in Tertiary volcanic rocks. Typical sections have been described by Powers (*4*), and I am currently engaged in more detailed studies of the sections in the northern half of the Pelona quadrangle for the New Mexico Bureau of Mines and Mineral Resources. Rock types range from rhyolite to basalt, and both flow and pyroclastic units are represented. Fluviatile and eolian beds are locally important. Thus, during most of the history of sedimentation in the basin, tributary streams have had continual access to a variety of types of volcanic rock. Significant variations in mineralogy of the basin sediments must be ascribed to variations in the surficial processes of erosion and deposition rather than to differences in the original character of source rocks exposed at various times.

The dissected flanks of two principal highlands on the south margin of the plains, O-Bar-O and Pelona Mountains, simulate the forms of broad lava cones. The basaltic lavas in these cones constitute the youngest volcanic unit that has been recognized in the north half of the Pelona quadrangle. They are probably as young as the Pliocene or Pleistocene.

The San Augustin Plains have the general form of a graben, although conclusive evidence of its origin has not been forthcoming. However, in several marginal areas, minor faults parallel linear segments of the topographic margins of the basin. These faults would be appropriate secondary members of fault zones, the principal displacements in which form structural boundaries to the basin. Near Bat Cave, late basalt flows peripheral to Pelona Mountain are broken by such faults. Thus, the San Augustin Plains appear to be a graben, the principal development of which postdates Pliocene or younger volcanics. No evidence was found of local volcanic activity contemporaneous to sedimentation in the graben.

The thickness of the unconsolidated sediments underlying the plains is known, from water wells, to exceed 1200 ft. If the graben is chiefly post-Pliocene (?), one would expect, as a first approximation, that the 645-ft core taken for detailed study would record, at most, the latter part of the Pleistocene. However, this approximation is extremely crude, and more precise inference of age must be sought in the core itself.

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References and Notes

1. See the accompanying papers by K. H. Clisby and P. B. Sears and by F. Foreman in this issue.
2. K. Bryan, *7th Biennial Rept. State Eng. New Mexico* (1926), pp. 81–87.
3. W. E. Powers, *J. Geomorphol.* **2**, 345 (1939).
4. ———, *J. Geol.* **49**, 207 (1941).

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San Augustin Plains—the Sediments

The sediments from an almost continuous 645-ft core from the extinct Lake San Augustin are being studied (*1*). This old lake floor, elevation 6775 ft. is situated in the southwestern part of the San Augustin Plains of New Mexico. The drill site is near the center of the present playa, some 4 mi from the nearest slopes of the surrounding hills. It is believed that the sedimentation in this part of the lake was least affected by fluctuations of lake level or by deposits from any one stream and that, therefore, this core gives as good a picture of the general lake sedimentation throughout its length as could be attained with a linear series of samples.

Textural analyses, petrographic studies, and carbon dioxide determinations are being carried out, and, in the clay-sized particles, some *d. t. a.*, x-ray, and spectographic analyses have also been made.

The work to date shows that, if authigenic minerals are disregarded, the sediments are nearly all clayey silts, except for the interval between 45 ft and 215 ft, where there are alternating layers of sand and clayey silts. However, from 80 ft to 125 ft in this zone, the sand is almost continuous.

Carbonates, calcite, and dolomite are authigenic and are found in all samples of the core; the CO_2 ranges from 0.3 to 26.4 percent but is generally between 2 and 6 percent. These carbonates occur in all grade sizes, sometimes as single crystals, sometimes as aggregates, and they vary in color from clear to white to buff. The allogenic minerals are evidently those of the igneous rocks surrounding the basin; feldspar, hornblende, pyroxene, mica, olivine, and quartz are commonly found, and, except for the mica, these are generally fresh and angular. In some instances, rock particles, usually subangular to round, occur. These are usually of andesitic rock but range from rhyolite to basalt. The clay-size fraction consists of clay minerals (montomorillonite, nontronite, and allophane) and carbonate (calcite and dolomite) with small amounts of allogenic minerals, chiefly quartz and feldspar.

The only fossils found in these sediments are pollen, algae, ostracods, and rare opaline particles that may be diatoms. The sedimentation in this lake was probably slow, except for the sand horizons between 45 and 215 ft. This sand is widespread, as is shown by the wells in the lake floor, nearly all of which find their water between the 60- and 200-ft levels.

It would seem, then, that conditions of erosion and deposition were fairly constant, except when these sand layers were deposited, and their origin appears to be the result of more rapid erosion by the streams entering the basin.

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Reference

1. See the accompanying papers by K. H. Clisby and P. B. Sears and by C. E. Stearns in this issue.

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When our conceptions are clear and distinct, when our facts are certain and sufficiently numerous, and when the conceptions, being suited to the nature of the facts, are applied to them so as to produce an exact and universal accordance, we attain knowledge of a precise and comprehensive kind, which we may term Science.—WILLIAM WHEWELL, *The Philosophy of the Inductive Sciences* (1847).