center of the building connecting the main and second floors is being eliminated. New stairways are being constructed on either side, leaving the central space free for exhibits. The main entrance hall will have new cases for changing exhibits and at the back, opposite the front door, a group of herring gulls and common terns on sand dunes at Plymouth harbor. The lecture room floor is being leveled so that the room can be used for children's work also. A new room for study collections is provided in the basement. Exhibits are being rearranged by all the departments with the idea of appealing to the public rather than of adhering to the purely scientific point of view. Herpetological exhibits, for instance, will emphasize life histories and economic value of reptiles and amphibians; birds are grouped by habitat and status as residents. New labels to interest the visitor are being worked out. The museum is closed while alterations are being made. The date for the reopening of the building has not yet been set, but it will probably be early in the coming year.

A COLLECTION of several hundred Californian plants which has all but encircled the earth is now being studied in the herbarium of the California Academy of Sciences in San Francisco. The specimens were collected in 1840 and 1841 by the Russians in the region then known as Russian California ("California boreal. Ross." the labels read) and were sent from California to the herbarium of the Russian Academy in St. Petersburg by way of Vladivostok and across Siberia. These same specimens which have remained unnamed for nearly a hundred years are being determined by J. T. Howell at the California Academy of Sciences after which they will be returned to the herbarium of the Academy of Sciences in Leningrad. The plants, which were collected in different parts of the Russian territory, were obtained by Vosnesensky ("Wosnessensky"), who was in the first party to climb Mt. St. Helena in the Californian Coast Ranges north of San Francisco. Fort Ross, the chief Russian port and settlement on the Californian coast, is about sixty miles north of San Francisco.

DISCUSSION

LENS-LIKE ACTION OF A STAR BY THE DEVIATION OF LIGHT IN THE GRAVITATIONAL FIELD

SOME time ago, R. W. Mandl paid me a visit and asked me to publish the results of a little calculation, which I had made at his request. This note complies with his wish.

The light coming from a star A traverses the gravitational field of another star B, whose radius is R_o. Let there be an observer at a distance D from B and at a distance x, small compared with D, from the extended central line $\overline{AB}$. According to the general theory of relativity, let α_o be the deviation of the light ray passing the star B at a distance R_o from its center.

For the sake of simplicity, let us assume that $\overline{AB}$ is large, compared with the distance D of the observer from the deviating star B. We also neglect the eclipse (geometrical obscuration) by the star B, which indeed is negligible in all practically important cases. To permit this, D has to be very large compared to the radius R_o of the deviating star.

It follows from the law of deviation that an observer situated exactly on the extension of the central line $\overline{AB}$ will perceive, instead of a point-like star A, a luminius circle of the angular radius β around the center of B, where

$$\beta = \sqrt{\alpha_o \frac{R_o}{D}}.$$

It should be noted that this angular diameter β does not decrease like $1/D$, but like $1/\sqrt{D}$, as the distance D increases.

Of course, there is no hope of observing this phenomenon directly. First, we shall scarcely ever approach closely enough to such a central line. Second, the angle β will defy the resolving power of our instruments. For, α_o being of the order of magnitude of one second of arc, the angle R_o/D, under which the deviating star B is seen, is much smaller. Therefore, the light coming from the luminous circle can not be distinguished by an observer as geometrically different from that coming from the star B, but simply will manifest itself as increased apparent brightness of B.

The same will happen, if the observer is situated at a small distance x from the extended central line $\overline{AB}$. But then the observer will see A as two point-like light-sources, which are deviated from the true geometrical position of A by the angle β, approximately.

The apparent brightness of A will be increased by the lens-like action of the gravitational field of B in the ratio q. This q will be considerably larger than unity only if x is so small that the observed positions of A and B coincide, within the resolving power of our instruments. Simple geometric considerations lead to the expression

$$q = \frac{l}{x} \cdot \frac{1 + \frac{x^2}{2l^2}}{\sqrt{1 + \frac{x^2}{4l^2}}},$$

where

$$l = \sqrt{\alpha_o D R_o}.$$

If we are interested mainly in the case $q \gg 1$, the formula

$$q = \frac{l}{x},$$

is a sufficient approximation, since $\frac{x^2}{l^2}$ may be neglected. Even in the most favorable cases the length l is only a few light-seconds, and x must be small compared with this, if an appreciable increase of the apparent brightness of A is to be produced by the lens-like action of B.

Therefore, there is no great chance of observing this phenomenon, even if dazzling by the light of the much nearer star B is disregarded. This apparent amplification of q by the lens-like action of the star B is a most curious effect, not so much for its becoming infinite, with x vanishing, but since with increasing distance D of the observer not only does it not decrease, but even increases proportionally to $\sqrt{D}$.

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PLEISTOCENE MAN IN SOUTHERN CALIFORNIA

ON the twenty-third of January of this year the Federal PWA Project, C-642, in an excavation project to build a storm drain from Los Angeles to the sea, unearthed what has proved to be a very interesting and doubtless significant discovery of early man in America. The chief engineer, Mr. J. J. Ryan, of the project, called the department of anthropology of the University of Southern California, Los Angeles, asking that some one be sent out to the excavation to examine some bones thought to be human which had been unearthed on Rancho Cienga O'Paso de la Tijera. Dr. Bowden, head of the department, and Dr. Lopatin, instructor in anthropology, went out and examined the discovery. A skull and other human bones were recovered from a gray sandy clay resting immediately upon the gravel some thirteen feet below the surface. Dr. Lopatin was left in charge for about ten days until all clues for possible cultural material had been examined. With the help of workers from the project an area of about 20 feet was carefully excavated under his direction.

It is thought that these bones and skull belonged to the same human being, since they were found together and since the deposit was altogether undisturbed, but there was no trace of burial. The skull and bones had evidently been covered with sandy clay by river deposits. The thirteen feet of clay was made up of five strata which were clearly distinguishable, since the storm drain runs in an east-west direction along what is probably the old bed of the Los Angeles River, the trench thus providing a splendid cross-section of the strata. All the deposits on the walls of this trench appear to be fairly well bedded, and even to a casual observer they are very clear. The strata run almost horizontally, thus making them easy to trace for hundreds of feet. Over these skeletal remains were four strata. Beginning at bottom the stratum was gravel, about four feet thick. Over that was a gray clay two feet thick, which covered the human remains; then three feet of very dark clay. The fourth stratum from the bottom was gray clay, three to four feet thick, with boulders enmeshed. The top stratum was three feet of yellow clay; no loam soil on top.

For several weeks the site was watched by Dr. Lopatin and the workers, with the hope that other discoveries of the kind would be made, and on the thirteenth of March about one thousand feet from the site where the human remains were found, several bones of a large animal were discovered. Four large teeth and some fragments of tusks came to light in close proximity to the large bones. For identification, Dr. Thomas Clements, of the geology department of the University of Southern California, was called in consultation. He identified these bones as those of the mammoth (*Archidiskodon imperator* Leidy).

Due to the extended and thorough excavation of the government project a thorough examination of the stratification could be made, and it was found that the mammoth bones were in the same stratum as that of the human remains and were covered to a depth of about 12 feet. Likewise there were five strata involved. The bottom, where the mammoth bones were imbedded, was that of gravel with sand about two feet thick. The next was yellow clay one foot thick. Overlying this was about two feet of black clay; then, less than two feet of peat of good quality. The top stratum was black soil seven feet thick.

The fact that the human bones and those of the mammoth were found in the same geological stratum enabled us to conclude that both the man and mammoth had lived at approximately the same time, *i.e.*, at the closing of the Pleistocene Epoch. Dr. Clements, after thorough examination of the complete stratification and environment, concluded that the geological stratification indicated Pleistocene strata.

All the bones, both of the human and the mammoth, were in a high state of complete fossilization and heavily coated with rock (sandstone and conglomerate). The human skull is badly damaged, lacking the entire facial part; only the posterior portion of the calvaria, or the brain box, is present. The skull is small in size. Judging from the state of the sutures of the cranium vault as well as from its small size and the smoothness of the external surface of the bones, the authors of this article came to the conclusion that the skull was that of a female well advanced in years. For the sake of