now famous Protoceratops with its supposed enemy, the Oviraptor or egg-snatching deinosaur. From the lower Ashile level the giant sauropods, Asiatosaurus, may have wandered to all the great continents except Australia. The fascination and the perils of fossil hunting among the Flaming Cliffs of Djadokhta for the eggs and skeletons of deinosaurs were recorded by instantaneous photography.

Successive Life Phases of the Age of Mammals.

Even closer and more continuous is the remarkable succession of Gobi formations starting with the basal Eocene Gashato, of the same age as the Thanet sands of England and rising through beds of the age of the London clay to the Hordwell and Headon of the Isle of Wight, where England's terrestrial formations are interrupted, presenting a series of extraordinarily close parallels with the great Rocky Mountain succession from basal Eocene to Miocene time. In the creodonts, uintatheres, and titanotheres of the Gobi region we discover close generic and almost specific affinities to their distant American cousins. But the giant Baluchitherium, which had ancestors in Upper Eocene time and attained its gigantic size in Upper Oligocene time, seems to have had a monopoly of the central and south Asiatic region, because it has never been found elsewhere. In the Miocene and Pliocene phases of the Gobi there are some breaks which will doubtless be filled by future discovery, but in the Middle Miocene, and again in the Upper Pliocene, we discover close kinship to Western Europe and North Africa, especially in the arrival of the proboscideans or mastodonts of remote African ancestry. Thus the high plateau region of central Asia, including, doubtless, Chinese Turkestan, Tibet, and Mongolia, is firmly established as the previously missing area of origin not only of the terrestrial life of the entire northern hemisphere, but also of life which wandered into the extremities of Africa and of South America as well.

Scientific truth is far stranger than scientific fiction. Gobia takes the place of the mythical Atlantis and other imagined continents as the source of most of the animal civilisations and probably also of most of the vegetal civilisations of the northern hemisphere.

Discovery of the Old Stone Age in 1925.

At least four periods in the Old Stone Age of man were recognised in the campaign of 1925, namely, in descending order, Azilian-Campignian, (?) Mousterian, Acheulean (much more doubtful), and (?) Eolithic. Directly opposite the Flaming Cliffs of Djadokhta was discovered a great human culture level believed to be of late Palæolithic, Campignian, and Azilian age, with thousands of implements, to the north-east of the Mousterian horizon discovered by Licent at Ordos in north China. Above this closing Old Stone Age level occurred, in order, traces of Neolithic, of Bronze, and of Iron ages, ending in traces of pre-Mongol peoples which are succeeded by burial-places of the Mongol race that ended with the warrior race of Ghenghis Khan and the conquest of all southern Asia by Kubla Khan.

Thus are written twenty-four new chapters in the prehistory of the earth by the expansion and elaboration of methods of research first introduced to the world of science by William Smith of Oxford in his chart showing the companionship of geology and palæontology, and in the most unexpected manner connecting Mongolia with England and, especially, with Oxfordshire.

Observations with the Spectrohelioscope.

By Dr. George E. Hale, For. Mem. R.S.

THE spectrohelioscope described in my article on "Some New Possibilities in Solar Research" (NATURE, July 3, 1926) has been provided with new oscillating slits and driving mechanism and an improved parallel-plate line shifter and micrometer for setting various parts of the Hα line on the second slit during observations, with divided arc indicating the exact wave-length employed. In this form the spectrohelioscope not only discloses the most delicate details of structure shown on the best Mount Wilson spectroheliograms, but has also served for the detection and measurement of some new and interesting phenomena.

Three cases observed on August 15 may be mentioned, all in the hydrogen vortices associated with the large spot group which on that day was near the central meridian of the sun. The first two were noticed south of the following spot of the pair. By rocking the parallel glass plate back and forth, thus showing the change in form with wave-length of two slender curved flocculi, their dark heads were seen to advance toward the spot as the Hα line was moved across the second slit from its centre toward the red. At a slit position about 1·3 angstroms from the centre of the line, the curved flocculi had disappeared, but their point-like extremities were still visible, projected against the outer boundary line of the penumbra. If we assume this effect to be caused by the rapid descent of the hydrogen in the vortex above the spot, the radial velocity was about 65 km. per second. Another slender flocculus south of the preceding spot behaved in the same way. A similar observation on August 16 gave a maximum radial velocity of 56 km. per second for the descending point. These velocities are of the same order as those of knots in prominences moving toward spots, measured by Slocum and Pettit on photographs of the sun's limb made with the Rumford spectroheliograph, and observed visually by myself with the spectrohelioscope.

Although I confirmed the new results on August 17, the day I left Pasadena for a month's absence, I wish to check them more completely before expressing a final opinion as to their interpretation. It now seems probable, however, that the spectrohelioscope can be used for a more complete analysis than has previously been possible of the hydrogen vortices surrounding sunspots. These vortices involve the prominences as well as the chromosphere, and a means of measuring the velocities of the hydrogen, seen in projection against

the disc as well as in cross-section at the limb, should prove of great service.

If we may interpret another group of observations in the same way, the parallel plate micrometer will also make it easy to distinguish eruptive jets, rising near spots and descending at some distance after following a long-arched trajectory, from the true vortex structure with which they are likely to be confused on spectroheliograms. At their source these apparent jets often appear as bright flocculi, seen on the violet side of Hα, which seem to become dark absorbing streams at a higher level and finally descend at a velocity sufficient to produce a marked displacement to the red, beyond the normal boundary of the Hα line.

Bright hydrogen flocculi include those of the quiescent or slowly changing type and those of short life, which change rapidly in form and intensity. These short-lived bright flocculi are themselves of two kinds: eruptions, shown by the spectrohelioscope, when near the centre of the sun, to give a displacement of the bright Hα line to the violet; and bright flocculi which are receding or stationary in the line of sight. From my recent visual observations, it appears probable that the short-lived stationary or receding bright flocculi are often due to the descent of comparatively cool hydrogen, which appears dark at high levels but turns bright as it falls. The distinction is important, as terrestrial magnetic storms and auroras will probably be found to result from the presence near the middle of the sun of bright flocculi of the eruptive type, which emit charged particles at velocities sufficient to carry them to the earth.

Spectrohelioscopes capable of distinguishing such eruptions, if they could be built at small cost and used systematically at a sufficient number of stations well distributed in longitude, should aid materially in determining the exact relationship between these solar and terrestrial phenomena. After considering several possible designs, and making a variety of preliminary tests, I am now building a solar telescope and spectrohelioscope which promise to be both inexpensive and powerful. From tests already completed, I find that a single plano-convex lens of 3 inches aperture and 18 feet focal length, used with a simple heliostat or cœlostat just large enough to fill it with light, will serve very well for the necessary solar telescope. In the spectrohelioscope a single prism, twice traversed by the sunlight, will take the place of a grating. Its dispersion will be adequate with a focal length of 13 feet, or by the use of additional prisms the focal length can be reduced. For general use, fixed monochromatic telescopes of the above type will be less expensive and probably more satisfactory than those carried by an equatorial mounting. Moreover, I have designed a spectrohelioscope for attachment to equatorial telescopes, but have not yet found opportunity to build and test it.

Continued use of the spectrohelioscope has strengthened my hope that in the hands of amateur astronomers it may contribute materially to our knowledge of the solar atmosphere. As another indication of its service, I may add that on June 26 last I observed a phenomenon recorded but once, and then incompletely, in the entire collection of Hα spectroheliograms obtained on Mount Wilson since the beginning of such records in 1908. This unique case was the sudden engulfment, on June 3, 1908, of a large dark flocculus (prominence) by the vortex associated with a sunspot, illustrated and described in "Solar Vortices," *Astrophysical Journal*, vol. 27, September 1908. The phenomenon of June 26 was very similar in appearance, and although the parallel plate micrometer was not then completed, I was able to see its final stage, which was necessarily missed in the earlier record. This was the appearance of a black dot, after the large dark flocculus had been sucked into the vortex, exactly upon the outer (preceding) boundary line of the penumbra, as in the observations of August 15 and 16. This could be seen only when the second slit was on the red side of Hα, indicating the rapid recession of the hydrogen. The detailed observations will be given later. The point to be made here is that many interesting and unfamiliar phenomena of the solar atmosphere, including cases of this kind, can be observed by any one who cares to equip himself with the simple and inexpensive apparatus required. A full description of the instruments now under construction will be published soon after the final tests have been completed.

News and Views.

THERE have just been placed on exhibition in the Geological Department of the British Museum (Natural History) the remains of a Stegosaur or armoured deinosaur, obtained by the late W. E. Cutler from the Belly River sandstone of the Red Deer River, Alberta. Baron Nopcsa, who will soon publish a description of the specimen, believes that it represents a new genus; but in any case it is closely allied to Panoplosaurus (Lambe) and Ankylosaurus (Barnum Brown) from the same beds, and is not very unlike Polacanthus (Owen) from the Wealden of the Isle of Wight. The chief interest of the specimen lies in the preservation of the plated skin still in position over the greater part of the skeleton. The bony plates range from large broad-based spikes, presumably covered with horn in life, to minute specks in the wrinkled skin of the neck. The skin of the under surface has left no trace and was no doubt relatively thin. The vertebræ of the back lie in a straight line, and the ribs were probably fused to them, as in Ankylosaurus. The sacral vertebræ are fused to one another. The vertebræ of the neck and tail were movable. The limb-girdles are clearly shown, and the large bones of the left fore-limb clearly retain their natural position, indicating a squat posture with a bend at the elbow, so that the height at the shoulder was only about three feet. The left hind-limb has been bent over the belly, and is almost complete. The skull is missing. The length of the fossil is 15 feet, and its breadth 6 feet. In the absence of jaws and teeth, the feeding habits must be inferred from those parts in allied forms. Baron Nopcsa holds the view that the creature roamed a sandy desert and lived on occasional swarms of