As regards the process which gives rise to two genes in place of one, two theories are mechanically possible. Either the daughter gene may be built up by the side of the old one, at a catalytic surface, with a point by point correspondence, or the original gene may become doubled and then split. The first would lend itself to a sort of 'zip-fastener' pattern with linear sub-units, as postulated by Serebrovsky. In Dr. Bridges' view, however, the phenomena described by Serebrovsky can be satisfactorily explained on lines of developmental mechanics without the postulate of linear sub-units of the gene. The gene might be a structure shaped

like a pancake, having a single layer of molecules built into a definite pattern. A difficulty in the way of assuming that the daughter gene is formed at the surface of a vesicle as repetitions of unitary patches is the fact that genes mutate suddenly as if acting as simple units.

It is probable that the structure of all genes will be found to be of one type. This follows from increasing simplicity with descent in the scale of units. There is far less difference between chromosomes than between organisms, and hence probably far less difference between genes than between chromosomes.

H. S.

New Game Reserves in South Africa.

By Prof. H. B. FANTHAM.

THE conservation of the natural fauna of a country is a matter of considerable importance. With the advance of agriculture and industrial development, the animals of South Africa, as in other parts of the world, have been in danger of extinction. In fact, within the last hundred years, six of its unique species, the bloubok, quagga, Namaqualand giraffe, Orange River buffalo, black-maned Cape lion, and the red hartebeest, have become extinct in the Cape Province, and many other species are in danger of extinction. The blesbok, bontebok, and white-tailed gnu only occur on private lands and have been preserved through the efforts of a few individuals.

The South African Government has not been unmindful of the interest and value of its fauna, and a number of large and important game reserves have been established, of which the Kruger National Park in the Transvaal of 5,000,000 acres (more than 7000 square miles) in extent, and the Umfolosi Reserve in Zululand—the home of the fast disappearing white rhinoceros—are perhaps the best known. Recently, on July 3, the Government of the Union of South Africa proclaimed three new game reserves, the constitution of which had been approved by Parliament on May 8.

The largest of these new reserves is termed the Kalahari Gemsbok National Park, in the Division of Gordonia, some distance north of Upington. This Kalahari reserve is about 1,800,000 acres (some 3000 square miles) in extent. It is an arid area, situated in the Kalahari thorn country between the Oup (Aub) and Nosop (Nossob) Rivers. The elevation is 2000-4000 ft. The vegetation consists mainly of thorn bush (species of *Acacia*), thorn-trees such as the camelthorn (*Acacia giraffæ*), which is the most characteristic tree of the region, and sparsely spaced tufts of desert grasses. The rivers are frequently dry sandy beds, which flow after rain, but water can always be obtained by sinking shallow wells. This reserve shelters a number of vertebrates, which feed on succulents and xerophytic vegetation, on which they thrive. These include the graceful and handsome gemsbok (*Oryx gazella gazella*), the red hartebeest, the blue wildebeest, and the springbok. The gemsbok was formerly widely distributed in southern Africa, but

now has become relatively rare and even extinct in many parts of the country. They flourish in the Kalahari wastes, where they roam in herds and feed on succulent roots and underground stems dug out by their hoofs. Under protection in the new reserve they should increase in numbers. In addition to the antelopes mentioned, the kudu occurs in the reserve, klipspringer are said to be present, and wild ostrich are known.

The second reserve is the Addo Elephants National Park in the Divisions of Alexandria and Uitenhage, Eastern Cape Province. It comprises an area of more than 11,000 acres, well covered with dense scrub and bush. Portions of the Union Forest Reserve and of a number of farms have been combined to form this game reserve, where the now small herd of the southern geographical race or subspecies of the African elephant can live and propagate. Abundance of *Acacia*, succulent *Portulacaria*, aloes, and other succulents provide ample food. A few years ago the Government was obliged to reduce the herd greatly, as they invaded neighbouring farms and did considerable damage. The presence of good watering places in the new reserve, it is hoped, will prevent further damage to cultivated lands by these interesting small elephants. Cape buffalo, which were almost exterminated by rinderpest, still survive in the Addo reserve, and kudu and bushbuck occur in herds. A similar race of elephants occurs in the Knysna reserve, comprising the finest indigenous forests in the Union, and in both the Knysna and the Addo wild pig are abundant, accompanying the elephants and feeding on their droppings, thus aiding in the dispersal of the seeds of trees.

The third reserve is styled the Bontebok National Park. It is situated in the Division of Bredasdorp in the south-western Cape Province. It is a small reserve, some 1700 acres in extent, and will be a sanctuary for the rarest of the South African antelopes, the bontebok (*Damaliscus pygargus*). For many years this small but most beautiful and richly coloured antelope has been confined to a few farms in this area and has been preserved through the efforts of a few individuals. Formerly it was widely distributed along the coastal strip, and without the active interests of the animal lovers

already mentioned it would, without doubt, have become extinct. It is highly important that the bontebok, the only indigenous large mammal of the south-west Cape, should be given a permanent refuge.

From my friend, Dr. E. Warren, Director of the Natal Museum, I learn that the mountain zebra at Cradock are still not adequately protected.

These animals are more beautiful than Burchell's zebra, and have adapted themselves to mountain life and bleak stony wastes. It has been suggested by Sir Lionel Phillips that they should be established in a reserve at Bain's Kloof, and, for the sake of posterity, it is to be hoped that a mountain zebra reserve will be proclaimed in the near future.

News and Views.

AMONG the many members of the Society of Jesus who have added to scientific knowledge, few were better known than the seventeenth century natural philosopher Francesco Terzi de Lana, the tercentenary of whose birth falls on Dec. 13. Like his friend and contemporary, Father Kircher, Lana published various works among which was his now very rare book, "Prodromo, overo Saggio di alcune Inventioni . . ." of 1670. In this, he described a series of useful discoveries and it has been called the first book of the science of aeronautics. To raise oneself in the air he suggested the use of four thin metal spheres exhausted of air and attached to a car. The experiment was never made, but Lana's ideas foreshadowed the balloon and airship. His other work of note was his "Magisterium Naturæ et Artis . . .", in which he intended to cover the entire field of the natural sciences; only three of the intended nine volumes were issued, but these have been referred to as "a veritable cyclopædia of all sciences connected with natural philosophy". Born at Brescia, Lana entered the Society of Jesus in 1647, studied at the Roman College and afterwards taught at Terni, Ferrara, and elsewhere. When his health began to decline, he returned to his native city and died there on Feb. 22, 1687.

ON Wednesday, Dec. 2, in the University Museum, Oxford, Prof. E. Freundlich, director of the Astrophysical Observatory at Potsdam, delivered a lecture on the results of the Potsdam Solar Eclipse Expedition to Sumatra in May 1929, to determine the deflexion of light in the sun's gravitational field and to examine its variation with distance from the sun. Dr. Freundlich dealt solely with the results obtained from the series of plates exposed in one of the two telescopes which were employed at Sumatra. Four of these plates were exposed on the star field immediately surrounding the sun and the remaining three on a star field at a distance of 25° from the sun. Exposures on the same star fields were also made at the same place some months later and at night. In order to obtain the highest possible accuracy it was not advisable to measure the distance apart of two star images on the eclipse plate and compare it directly with the corresponding distance on the night plate. Plates exposed so as to obtain laterally inverted images of the star fields were adopted as intermediate standards of comparison.

PROF. FREUNDLICH showed that after corrections for aberration and refraction had been made, the star image displacements could be expressed as the sum of two terms, one, the scale effect term due to small

variations in focal length of the observing telescope, and the other due to the actual light deflexion. The change in focal length is primarily a temperature effect. It manifests itself in the same way as the light deflexion, that is, it gives rise to a dilatation, which, however, increases with increasing distance from the sun, whereas the light deflexion effect decreases. Unfortunately, the weight of the coefficient of the scale effect term is approximately two hundred times greater than that of the light deflexion term, but by superimposing on each plate the image of a specially prepared 'reseau' placed at the focus of a collimating lens, Prof. Freundlich and his collaborators were able to differentiate between the two terms and obtained the value $2.24'' \pm 0.20''$, instead of the value $1.75''$ as predicted by theory for the deflexion of a beam of light in the sun's gravitational field. A recalculation of the results of the Lick expedition paying particular attention to the influence of the scale effect term yielded a value of $2.2''$. A revision of the field equations of the theory of relativity would appear to be of the highest importance.

DURING the last few weeks, much interest has been aroused by the discovery of fossilised remains of the mammoth (*Elephas primigenius*) near Nottingham. Similar remains have been found, from time to time since the middle of last century, at other places in the vicinity of the city. Unfortunately, nearly all of these have been lost or destroyed. Even so recently as three years ago, a complete skull was found and promptly destroyed by the workmen, and only a small fragment of one of the tusks was rescued. It is hoped that the publicity given by the newspapers to the present find will result in a more enlightened treatment of such remains in future. The Trent Gravel Company's workings are in a patch of the older river gravels, situated half a mile away from the river Trent at Attenborough. These gravels were deposited after the last erosional phase of the river and now underlie its present flood plain. The remains which were recently found consist of one tusk five feet long, a third upper and a corresponding lower molar. They were found twenty feet below the surface, in the bottom layers of gravel. One molar was much worn by rolling, and must therefore have been derived from older deposits. The condition of preservation of the other, and the fact that it had not been rolled, show that it was contemporary with the gravel in which it was embedded. It thus furnishes additional testimony in favour of the view that the mammoth survived into post-glacial times in Great Britain.