The Solar System and its Origin

IN Prof. H. N. Russell's recent book of the above title, the belief is expressed that the assumption of the sun having been originally one component of a binary star would help to resolve certain difficulties. To get rid of the other member an almost central collision with another star is invoked, but I have shown that a close encounter of the sun's companion with another star may disrupt the system, both stars escaping from the sun.

If we assume that during such an encounter a filament of material is ejected between the two stars, then it is natural to suppose that the velocities of the various portions of this filament relative to the sun will be distributed more or less uniformly between the velocities of the two escaping stars. Under a wide variety of conditions of encounter, a reasonable proportion of the filament may be left with velocities less than that of escape from the sun, and in this way the primitive planets formed. Further, it can be shown with no severe restriction on the encounter that the angular momentum per unit mass may have been in the same general direction round the sun, though very different in amount for the various condensations in the filament.

These primitive planets, having all been produced in a comparatively small region, will return to somewhere near the region, and accordingly there is an opportunity for the subsequent production of satellites by close encounters between the planets themselves. In this connexion, it is interesting to note that the moon could have been produced by an encounter of the earth with Venus.

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Points from Foregoing Letters

DR. R. J. TILLYARD gives a drawing of the veins of the wings of a recently found fossil cockroach of Lower Permian age and compares it with that of the present day giant Australian termite *Mastotermes*, which represents the most archaic type of that order. The close correspondence in the vein arrangements indicates that termites and cockroaches have a common ancestor, and that while the wings of the cockroaches have developed, those of termites have been in part eliminated.

Preliminary results obtained by Dr. E. Bäcklin and H. Flemberg with an improved apparatus for determining the charge of an electron by means of the oil-drop method give a value of $4 \cdot 800 \times 10^{-10}$ abs. E.S.U., which is in closer agreement with the value obtained from X-ray spectrographic data than the previously accepted value ($4 \cdot 752 \times 10^{-10}$).

F. C. Frank discusses the question whether the value for the electronic charge obtained from X-ray measurements on calcite may not be vitiated by imperfections in those crystals. From the work of Joffé on electrical conduction in calcite, he infers that imperfections (unfilled lattice spaces) exist ; this would apparently increase the value of the electronic charge by about 1 part in 5,000.

In recording X-ray diffraction by gases, one may replace the photographic plate by a Geiger-Müller counter (for counting ionising particles), according to W. van der Grinten and Dr. H. Brasseur. The authors submit a curve of intensities obtained by passing X-rays through carbon tetrachloride gas, and deduce a value for the distance between chlorine atoms in good agreement with that previously known.

By seeding a brass alloy containing 52 per cent copper in process of solidification with copper crystals, and analysing with X-rays the orientation of the resulting crystals, A. B. Greninger finds a sequence of crystallisation from bottom to top : (1) copper crystal seed, (2) primary crystallised α-phase having the same orientation as the copper seed, (3) large β-grains having a narrow rim of segregated α-phase.

By means of apparatus which enabled them to sort out the atoms of positive from those of negative overall moment (of the same magnitude), J. M. B. Kellogg, Prof. I. I. Rabi and J. R. Zacharias find that the magnetic moment of both the proton and deuteron are positive.

DR. L. Infeld states that it is possible to formulate a simple unitarian field theory which, when used in the formula for the scattering of light by light derived by Euler and Kockel, enables the approximate determination of the fine structure constant.

Drs. N. Kemmer and V. Weisskopf have derived the deviations from the Maxwell equations caused by the existence of the positron in a manner free from the ambiguities formerly attached to this calculation.

The surface tension of certain soap solutions passes through a minimum and rises again with increasing concentration, while still remaining considerably below the surface tension of water. Gibbs's theory would then require that there should be more water and less soap in the surface layer than in the interior of the solution, which is not the case. Prof. J. W. McBain considers that the possible existence of another preliminary factor contributing to the lowering of surface tension, namely, the interchanging of positions between molecules of solute and solvent within a few molecular diameters of the surface, may explain the apparent paradox.

It has long been known that, under suitable conditions of illumination, the shadows of the retinal blood-vessels can be seen. Prof. R. W. Ditchburn has examined this effect with monochromatic light and finds that the shadows are much more easily seen with blue light than with green. Reasons for this difference are suggested.

F. Greenshields reports that in certain insects which lay eggs without fertilisation, the cells contain twice the basic number of chromosomes in the male (diploidy) and four times the number in the female (tetraploidy). This observation makes it necessary to find a new explanation for the sterility of the fatherless male offspring. It throws some light, on the other hand, on the 'pre-conjugation' observed during the maturation of the reproductive cells in the bee and gall-wasp.

A simple method of testing the homogeneity of wood, which may have been employed by famous makers of string instruments in the past, is described by Dr. K. Lark-Horovitz, It depends upon observing the heat conductivity of wood in different directions, by covering it with a thin layer of wax and noting the shape of the molten figure when a hot wire is applied to it at a given point.