If the stress is a little below the elastic limit, no change of structure can be noted on the Laue's diagram during a period of six hours. When, however, this limit was passed, a well-marked stretching

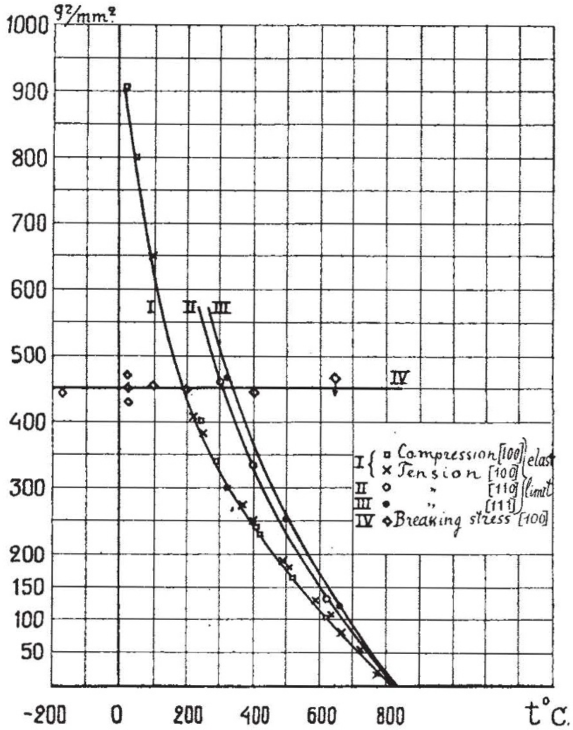

FIG. 1.

of the spots was observed on the fluorescent screen after one minute. The melting point is instantly visible by the appearance of diffuse Röntgen light on the screen.

The straight line IV relates to the breaking tensile stress of rock salt. There is no appreciable change from $-190°$ to $+650°$ C.; the errors were within from 5 to 10 per cent. At 200° C. the curves I and IV cross one another. For temperatures below 200° C. the breaking stress is reached before the flow of crystal begins; and thus the rock salt becomes brittle. Above 200° C. the crystal flows before reaching its breaking point, becomes strengthened, and the salt seems to be plastic. The temperature dividing the brittle and the plastic state of the crystal depends upon the kind of strain and the orientation of rock salt. It seems that in every solid body there is a brittle and a plastic state.

FIG. 2.

The residual strain consists in a slip and turn of the parts of the tested crystal. The strength of rock salt increases rapidly with the increasing change of structure. Instead of 450 gm./mm.² the breaking tensile stress reaches 5000 gm./mm.²

The investigation of the changes accompanying this phenomenon by the method of Röntgen analysis had shown that a new arrangement of small crystals, making them stronger, takes place; there appear also to be amorphous layers between the crystal grains, which are not changed themselves. It is impossible, however, to explain the whole rise of strength in this way. The real strength of rock salt may be many hundreds of times greater than that usually observed; it may be near to the value given by the electric theory of crystal lattices (200 kgm./mm.²). As Griffiths suggests, the cause of the rupture may be found in the crevices at the surface of the tensile bar. If the observed early failure has its cause at the surface, the rupture can be prevented by dissolving the surface of rock salt with water during the stress. In fact, in spite of the low temperature (below 100° C.) the rock salt began to flow and was broken at a very thin section only at a stress of 150 kgm./mm.² (instead of 0·45 kgm./mm.²); this is not far from the theoretical value.

Fig. 2 shows a crystal of rock salt, which was stretched in such a way that its middle portion was surrounded by hot water. The cross-section of this part was 5 mm.²; nevertheless, the crystal was broken by a force of 25 kgm. at a dry section of 56 mm.² area. The dry part was torn by a stress of 440 gm./mm.² at the same time as the wet part supported without breaking a stress of 5000 gm./mm.² It is interesting to note that a saturated solution of salt had no influence upon the ductility and strength of rock salt.

A. JOFFÉ.
M. KIRPICHEWA.
M. LEVITZKY.

Physical-Technical Röntgen Institute,
Petrograd, January 12.

Origin of Solar Systems.

I WISH to express respectful admiration for the dynamical analysis which has enabled Mr. Jeans to give such a discourse as you have happily reproduced in the issue of NATURE of March 1 on the genesis of stars. His tentative deductions about a possible mode of origin for our solar system are also of profound interest, and I may be permitted to ask a question.

Assuming the consequences of a passing stellar visitor to be as stated, is it superfluous to consider whether during the act of formation of a double star, in the giant stage, anything of the same kind could happen? I know that no leisurely action could achieve the result, but I believe that the initial stages of budding or gemmation are accompanied by rapid recession of the twin masses to a definite distance from each other, under tidal forces, before the leisurely recession begins; and it is during this jerk away that there seems good chance of a drawn-out or linking jet from each of the gaseous masses. If that were so, the formation of a solar system—though of a variety somewhat differing from ours—need not be an exceptional or rare occurrence.

OLIVER LODGE.

Normanton House,
Lake, Salisbury,
March 2.

A DEFINITE answer to Sir Oliver Lodge's interesting question is still, I fear, quite outside the range of exact dynamical analysis. We know that the formation of a binary star begins with a cataclysm, we know the stage of the star's evolution at which this cataclysm occurs and the direction in which it starts, but we have very little detailed knowledge as to subsequent events. We connect up the final product and the initial star mainly through mere general principles