into white tin. The whole cell is then slowly heated up in a water bath to 5 deg., 10 deg., and 15 . . . deg. Cent.; there is a potential difference between the grey tin and the white tin, which is measured by the Poggendorff potentiometer method. When the temperature has come up to 18 deg. Cent., the potential difference vanishes, showing that the grey tin (left in the formerly cold limb) has also been converted into white tin at that temperature. The reversible change may hence be expressed: grey tin $\overset{18^\circ}{\rightleftharpoons}$ white tin. The addition of the pink salt accelerates the change in both directions; this can be explained, but Professor Cohen did not enter into this explanation during his discourse.

In order to measure the volume change accompanying the transition, Professor Cohen connected a cylindrical glass vessel, charged with about 70 grammes of grey tin and water, with a **U**-tube filled with mercury; on the mercury floated a piece of iron which was suspended by a thread from a pulley, and a long pointer was attached to this pulley. When the cylinder was lowered into warm water the grey tin changed into white tin, and the resulting diminution of the volume was indicated by a sinking of the mercury level and a rise of the pointer. In this way Professor Cohen demonstrated that the volume change at the transformation amounted to as much as 30 per cent., and this was confirmed by determining the densities of the two modifications, white tin having the density 7.28, and grey tin the density 5.70. This enormous increase in the volume leads to the disintegration of the white tin when passing into the grey modification; warts begin to appear on the surface, the tin swells, and the warts afterwards crumble into a grey powder.

Since the transition temperature of 18 deg. Cent. (64.4 deg. Fahr.) is so low, it might be objected that white tin should practically be unknown. But the change is very slow, and we know from the analogy of water that undercooling is possible. Yet if the theory be correct, all tin should turn grey as soon as the temperature falls below 64 deg. Fahr., and Professor Cohen found that this was so. He examined the tin coins and art objects of museums, and made inquiries of dealers in tin ware, and he was able to show photographs of some very badly corroded objects, coins, a coffee-pot, organ-pipes, &c., which were covered with warts and holes. At ordinary temperatures, as just stated, the change proceeds very slowly. At lower temperatures the change takes place more rapidly; at —48 deg. Cent. it is very rapid, and Professor Cohen has hastened the change by bringing the white tin in contact with some grey tin. When a block of good Banca tin was brought in contact with grey tin at —5 deg. Cent., the change was very marked in a few weeks, while a block kept at + 15 deg. Cent. was not badly corroded after eight years. The decay or transformation starts from the particle of grey tin, as a small crystal of ice, a germ of ice, dropped into the undercooled water becomes the centre of a crystallization. In a similar way every particle of grey tin becomes a centre for the formation of more grey tin; the transformation advances very slowly in the dense metal, but the particle of grey tin acts like the germ of a disease, and in this sense it may be said that the tin is infected, and that all tin is liable to infection with the tin disease or tin pest. In the cold galleries of museums the danger of the tin infection is particularly great, and this museum disease is very prevalent. It can be prevented by keeping the temperature above 18 deg. Cent.

Technically the tin pest is not so serious, fortunately, because it does not appear to affect the alloyed tin. In what way the presence of other metals exercises a retarding effect does not seem to be well understood. Professor Cohen did not refer to this side of the problem; but it was pointed out during the discussion, by Mr. J. W. Hinchley, that terne plates (whose coating consisted of a tin-lead alloy) made good moulds for refrigerating plant, while tin plates always failed. Whether or not lead is subject to a similar disease as tin is doubtful. Professor T. Turner mentioned that **Canadian architects distrust roofs built up of iron and glass and lead,** because the cold is believed to affect the lead. Professor Cohen had so far been unable to decide whether or not lead was liable to suffer from the cold. Cases of failure in the lead walls of sulphuric-acid chambers, which he had examined, and in which chemical corrosion seemed to be out of the question, rather suggested to him a different phenomenon, a strain disease, to which most metals were subject. To avoid confusion, he had not referred to this disease, of which Professor Ewing and Dr. Rosenhain spoke after his lecture. When crystals of metals are broken up by severe straining, they begin to recrystallize; that, in Professor Cohen's opinion, would be a rearrangement, not a transformation of state, and an irreversible, but also infective, process. On the other hand, Professor Cohen emphasized that the tin pest was characteristic of the pure metal, and he felt sure—though he was, of course, anxious to investigate the point—that some exceptionally pure tin, which Mr. G. T. Holloway had obtained from Nigeria, would also be liable to the pest; the natives run this tin into straws or reeds, and it does not appear to contain any impurities except traces of iron. That the grey tin always contains some oxide does not disprove Professor Cohen's assumption. For the fine grey powder would naturally oxidize more readily than the compact white tin. This oxidation may prevent the ready reconversion by heat of the grey tin into ordinary white tin; but re-fusion of the grey tin with the addition of some carbon to reduce the oxide always yields good white tin again.

NEWS ITEMS.

It is stated that the new hydraulic forging plant of the Nova Scotia Steel & Coal Company is almost completed.

The Canadian Iron Corporation contemplates erecting a gas plant in connection with its works at Fort William.

The report of the American Iron and Steel Association shows that the Independent Steel Companies have gained much more in percentage of output during the period 1902 to 1911 than have the Steel Corporation.

In pig iron the "independents" gained 57.1% in production while the Corporation only gained 48.3 per cent.

DISTRIBUTION OF STRESS.

The meeting of the Physical Society at Finsbury Technical College, England, recently was remarkable for a number of exceptionally brilliant experiments relating to surface-tension, acoustics, and optics; but the matter of chief importance in its practical bearing was the demonstration by Professor Silvanus Thompson and Professor E. G. Coker of the use that can be made of polarized light in solving engineering problems in regard to the distribution and amount of the stresses in tension members. It has of course long been known that a plate of glass when submitted to a bending or twisting stress exhibits changes in its properties in respect to polarized light. In the present experiments the investigators have developed the apparatus to such an extent that comparatively large specimens of transparent material can be brought into the field of vision, with the result that celluloid models of parts of girders and other structures can be examined optically while being subjected to known mechanical stresses. By this means, the distribution of stress in prox-