paths become unstable at a definite temperature, the magnetic centrifugal force might make there motions one-sidedly unstable at another temperature.

If the creation of ordinary resistance in supra-conductors with currents above a certain threshold value, which is fully described in Comm. N°. 133, really is a peculiarity of the supra-conducting metal, and not due to disturbances, then the new phenomenon might also be connected with this property. In fact if it were once proved — to use an image already introduced into my paper for the Congress in Chicago — that the vibrators which cause the resistance can only be set in motion when the stream of electrons passes them with sufficient rapidity, then it would not be surprising that the magnetic resistance does not arise until the rapidity of the circulating motions of the electrons is great enough to carry the atoms with it and set them in rotation, by which they can then disturb the regular motion of the electrons.

Finally, it is certain that the phenomenon described is connected with the laws of magnetisation of supra-conductors which are as yet unknown.

Before however drawing definite conclusions from the new phenomenon, it is desirable to gather more experimental information on the subject.

Physiology. — *"Electrocardiograms of surviving human Embryos"*. By Prof. J. K. A. WERTHEIM SALOMONSON.

(Communicated in the meeting of February 28, 1914).

By the kindness of Dr. H. TREUB, Professor of Obstetrics and Gynaecology I was enabled to record the electrocardiograms of 3 human embryos, born after operation for extrauterine pregnancy etc. The age of the embryos was given as about 6 weeks, 5 months and 8 weeks and agreed with the length measurements.

As the operations were performed in the University Institute for Obstetrics and Gynaecology, the embryo had to be sent to my laboratory in the University hospital about one mile distant, there being no telecardiographic connection between the two.

The embryo was put into a bottle containing a warm solution of RINGER. In the laboratory it was immediately placed in the hot moist chamber, which I had formerly used for my experiments with chicken embryos. The leads to the EINTHOVEN galvanometer were placed on the upper part of the thorax and on the abdomen.

The first embryo gave only a few rather poor tracings. I suppose that its early stage of development, the effects of the shaking during transport and perhaps of a change of temperature may have been the cause. From the second and third embryo I got a series of satisfactory tracings.

I may be allowed to show first the tracings from the last embryo, which were obtained on a plate moving 20 mm. a second, an enlargement of 1100 times, and a string of high resistance and sensibility adjusted to a 30 mm. deflection for 1 millivolt.

Looking at the tracings we immediately see that the heart action was not entirely regular. The interval between two contractions is not equal. The complexes occurring with every heart-beat also showed a notable difference. In the first tracings we see two different forms, alternating regularly. A little later an intermediate form occurs a few times and in the last negatives we see only one of the first complexes. As a point of interest we note the complete absence of waves which might be identified as *P*-waves.

The different complexes bear a decided resemblance to heterogenetic complexes occurring after stimulation of the right and left ventricle. A contraction showing the form of a *B*-complex in which there is a lesion of the right bundle, is followed each time by a complex of the *A*-type, where the contraction is caused by stimulation of the right bundle or the right ventricle.

Already in the fourth negative we see *B*-complexes which are not followed by an *A*-complex. In the 5th negative we find for the last time two complexes slightly resembling *A*-types, but with a much smaller amplitude and a few particulars that cause them to be considered as intermediate or *C*-types. After this we see only *B*-complexes with a very slowly decreasing amplitude. The last tracings become very irregular and show many small anomalous complexes of different types.

In the second embryo, measuring 26 centimetres, the thorax had been opened by Prof. TREUB, who was in doubt if the heart was still beating. Here the contractions came in groups of 10—20 or even 2—5 single beats, in the same way as was seen with chicken embryos.

The curves were traced with a velocity of 25 mm. per second; the sensibility was adjusted at 10 mm. per millivolt.

All the contractions showed atypical complexes of the *B*-form starting with a descending curve, rising afterwards. Generally the first contraction in a group was a rather small one, the next ones being somewhat larger. The groups ended abruptly.

The first descending part in such a complex was generally interrupted by a few short waves. after which the descent became regular. The ascending part was less steep and ended in a blunt summit. Before this last wave sometimes a small intermediate wave could be detected.

About 10 minutes later between the regular complexes as described above, other anomalous ones appeared, of a much longer duration. The number of these grew, and the form first observed disappeared entirely. At last the tracing showed merely a series of continuously changing, very abnormal complexes.

It is difficult to explain these tracings. We know of course that they are related to extremely abnormal circumstances. We have before us a heart, very imperfectly developed, the halves of which freely communicate, the ductus Botalli still being largely open. An embryo with such a heart is asphyxiated without the possibility of a normal large or small circulation, as at the same time the circulatory system is entirely void of blood, and the heart cannot pump any other fluid into the placentary or proper circulatory system. The consequences are not, even approximately, to be foreseen. We can only consider one or two points.

The normal stimulus for the heart starts near the right venous sinus. But in the long run this necessitates the presence of blood in the vessels. If this is and remains absent, the sinus node stops its work. In such a case other parts of the auriculo-ventricular bundle may temporarily continue the work. In the embryo n°. 3 we find the evidence, that this occurs alternately in the left and right part of the bundle, and later on only in the left part. The result is a ventricular automatism. At last the left part of the bundle also breaks down, but at this moment the overworked muscle contains so much fatigue-products as to cause a "diathèse de contracture", and to produce idiogenetic irregular ventricle contractions, originated in the muscle-substance itself without the aid of the bundle of His-Tawara. In the larger second embryo, with the exposed heart these irregular spasmodic contractions occurring at the same time as the lengthened complexes could easily be seen.

If the complexes produced by the second embryo may be considered as to be caused by a temporary ventricular automatism, the small waves in the commencement of the first descending part of the wave may be taken as recurrent auricular waves. As these commence about the same time as the ventricular complexes, the starting point of the stimulus ought to be situated not in the ventricle itself, but somewhere between the auricle and the ventricle.

In the common well-known atypical complexes of the *B*-form we never see this recurrent wave and in the rare clinical cases with recurrent auricle wave it is seen after the *R*-wave. Though this seeming discrepancy can be accounted for, we may perhaps find a fuller explanation after a continued research.

Geology. — "*On homoeogeneous inclusions of Kawah Idjen, Goentoer and Krakatau and their connection with the surrounding eruptive rocks.*" By H. A. BROUWER. (Communicated by Prof. G. A. F. MOLENGRAAFF.)

(Communicated in the meeting of February 28, 1914).

From the study of homoeogeneous inclusions of eruptive rocks it is apparent which rocks of great depth may crystallize out of the mothermagma, and to which differentiations this magma was subject during the formation of a certain volcanic complex, even when the eruptive aequivalents of certain products of differentiation, occurring among the inclusions, are not known among the volcanic rocks of the complex. Further, they show us the conditions of crystallization of certain minerals, which only under special conditions can be formed out of a magma of a certain chemical constitution [1]). For the determination of the relative age of rocks of the same volcanic complex the study of inclusions is an important resource, especially for the Indian volcanoes, which for the greater part are built up from loose rolled material, natural denudations being of little occurrence.

Kawah Idjen.

The volcanic products of the Kawah Idjen [2]) consist chiefly of cinders and stones, which are partly hardened into a conglomerate and are beautifully denudated in the precipitous walls that surround the lake of the crater. Somewhat above the locks of the irrigation which when the level is high unloads the lake, there begins a flow of lavas that follows the left shore of the drainage. Along the precipitous slope to the locks and in the stream of lavas, during a short visit in August 1912, some homoeogeneous and enallogeneous inclusions were collected. The enclosing rocks are hypersthene-augite-andesytes, in which numerous light-coloured phenocrists of plagioclase form a contrast with the gray to grayish black glassy groundmass.

[1]) A. LACROIX, Les enclaves des roches volcaniques Mâcon 1894 Id. La Montagne Pelée et ses éruptions, Paris. 1904.

[2]) R. D. M. VERBEEK and FENNEMA, Java en Madoera. I. p. 81. Amsterdam 1896.