probably be a difference of temperature between the coils, and the mean would be taken. On testing the matter, however, no such difference was found, even up to the highest temperature used, 250° C. If any difference existed it was less than one-tenth of 1° C., as that amount could have been measured. This being the case in a narrow tube where the air circulation was hindered by a number of mica discs (see *Physical Review*, February 1893, for description of apparatus), it is improbable that there is any appreciable difference when there is no hindrance to the air currents except the heating coil of platinum.

I have never used the apparatus for very high temperatures, but see no reason why it should not be so used; and it would apparently present a number of advantages for such work, chief among which is the fact that the temperature would be obtained by direct comparison with an air or nitrogen thermometer, and no assumptions made as to the law of variation of thermo-electric force with temperature.

It can, of course, be made self-recording by placing a recording pressure gauge in place of the mercury column, the observer simply keeping the galvanometer at zero by manipulation of the carbon resistance.

It is obvious that platinum resistance coils can be used instead of the thermo-junctions, the platinum resistance coils forming two arms of a Wheatstone bridge, and the galvanometer placed across them.

A method of measuring the heat conductivity and temperature coefficient of metals devised by me, and at present being used by one of my students, may be of interest. A metal bar, well annealed, polished, and with special precautions taken to preserve homogeneity of physical state, has its ends placed in two mercury baths, A and B. The bar is protected from radiation by concentric polished metal tubes. A is heated electrically, and B cooled by a water tube. In the regular laboratory exercise, I have been in the habit of letting the students use thermometers. But in this case, where accurate results are required, capillary tubes are led off from A and B, filled with mercury, thus forming a thermo-junction. Another thermo-circuit has its junctions placed at the entrance and exit of the cooling water. It would, of course, be possible to measure the thermo-voltage directly by standard cell; but instead of this, in the present method, the two thermo-circuits are balanced against one another, the elements which are immersed in the water being chosen so as to have a much higher thermo-voltage than the copper-mercury couple. It is seen, without much difficulty, that by this means the conductivity of the copper may be measured without knowing more than one temperature, and that only approximately, to a considerable degree of accuracy. As the experiments are not concluded, I am unable to state definitely what the value of the method is, but the indications are that it will prove successful. REGINALD A. FESSENDEN.

Western University of Pennsylvania.

On Crookes' Spectrum of Helium.

IN his investigation on the spectrum of helium,[1] Crookes has examined the spectrum of five different samples of gas, two being developed from cleveite (No. 1 and No. 5), another from uraninite (No. 2), and two from bröggerite (No. 3 and No. 4). Sample No. 5 has been prepared with special care, and is designated "helium purissimum." The five spectra are by no means identical, and it has been concluded that besides helium there are other gases present. E. A. Hill[2] has even gone so far as to infer the existence of at least fifteen new elements from the comparison of these five spectra. Thirty of the seventy-nine wave-lengths measured by Crookes coincide (within the limits of error) with wave-lengths that we have measured in the spectrum of cleveite gas.[3] But the remaining forty-nine lines, many of which are strong, do not coincide with any of ours. As far as we know, it has not been noticed that thirty-three of these forty-nine lines almost certainly belong to argon, among them nearly all the stronger lines. Six more may also be argon lines, but the identification is rather doubtful. Two lines in all probability are mercury lines, which naturally are likely to appear in a vacuum-tube made by means of a mercury pump. One line may be due to carbon. The table on p. 246 contains a list of the forty-nine wave-lengths that do not coincide with wave-lengths that we ascribe to helium, and gives their probable origin. The wave-lengths of argon lines are taken from Kayser (*Chemical News*, August 30, 1895), Eder and Valenta (*Ber. der Wiener Akad.*, October 24, 1895), and from Crookes' own measurements.

3890·5 and 3885·9 are strong lines that have been seen in the spectra of all five samples. Crookes considers them as satellites or components of the strong line between them, the wave-length of which is 3888·785 according to our measurements. But as our photographs show that this line is single, or if not single has a weak component 0·05 lower, which can only be observed with much greater dispersion than Crookes has used, we are inclined to believe that 3890·5 and 3885·9 are spurious lines due to some error of apparatus having made their appearance on account of the enormous energy of 3888·8.

Of the five remaining lines, three are only of intensity 2. The two stronger ones have only appeared in the gas from uraninite, and may possibly belong to a substance hitherto unknown. But it is far from being established.

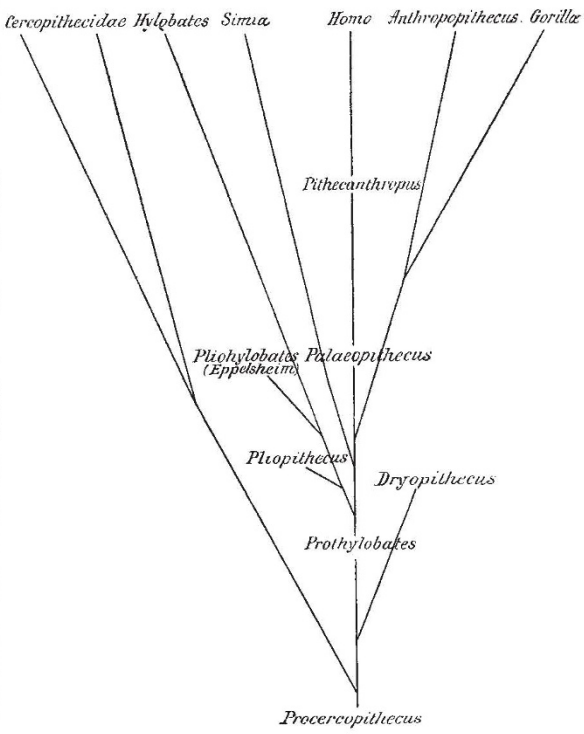
C. RUNGE AND F. PASCHEN.

Hannover, Technische Hochschule.

[1] *Chemical News*, August 23, 1895. reprinted in NATURE, August 29, 1895.
[2] *American Journal of Science*, November 1895.
[3] *Berichte der Berl. Akad.*, July 1895. See also NATURE, September 26, 1895,

The Place of "Pithecanthropus" in the Genealogical Tree.

IN the report on the scientific meeting of the Royal Dublin Society on November 20, in NATURE of December 5, 1895, it is stated that I placed Pithecanthropus in the genealogical tree, drawn by Prof. Cunningham, below the point of divarication of the Anthropoid apes from the human line. This indeed I did. But this statement could be misleading as to my real views on the genealogy of Pithecanthropus, such as I stated them already on p. 38 of my original memoir ("*Pithecanthropus erectus*, Eine menschenähnliche Uebergangsform aus Java," Batavia, 1894), and more fully at the last meeting of the Anthropological Institute of Great Britain and Ireland, on November 25.



It may not be superfluous to explain my views here by means of the accompanying diagram, representing the evolution of the Old World apes from a hypothetical common ancestor, whom I call Procercopithecus.

In Prof. Cunningham's tree, figured in NATURE of December 5, p. 116, he regards the left branch as all human, the right one as entirely simian, and he placed Pithecanthropus midway between recent Man and the point of divarication.