funds. The social insurance authorities have had to close the children's sanatorium at Lichtenberg and dismiss the personnel, and the full utilization of the great sanatorium at Beelitz is threatened.

THE Henry Phipps Institute of the University of Pennsylvania has received a grant of $25,000 a year from the Carnegie Corporation, and $25,000 for two years from the university trustees. The conditions which must be met that advantage may be taken of the Carnegie grant are, first, the grant itself be expended for research, and second, there shall be previously expended for research not less than $50,000 a year, derived from other sources, in any year in which this grant is claimed.

A CORRESPONDENT writes: " Dr. E. H. Sellards, geologist in the bureau of economic geology of the University of Texas, has been given leave from the University in order to undertake geologic investigations for the State of Texas in the Attorney General's Department relating to the Texas-Oklahoma boundary line on the Red River. The United States Supreme Court has held that the treaty of 1819 between the United States and Spain made the south bank of Red River the boundary between the two countries, and that by subsequent treaties and congressional acts this line as defined by the treaty with Spain has become the boundary line between Texas and Oklahoma on the Red River. However, there remain undetermined the questions : What constitutes the south bank of this river ; where was the south bank approximately one hundred years ago when the treaty with Spain was made ; and by what process has the river departed from its position of one hundred years ago, that is has the river moved gradually as by accretion to its banks, or suddenly as by ovulsion. The actual location of the boundary line between the two states for a distance of three hundred miles or more is contingent upon the Supreme Court's decision on these points to be made in accordance with the evidence that may be presented."

UNIVERSITY AND EDUCATIONAL NEWS

VASSAR COLLEGE receives $150,000, and Barnard College, Yale University, the University of Rochester and Colgate College, $10,000 each, by the will of the late Dr. Henry M. Sanders, formerly pastor of the Madison Avenue Baptist Church, of New York City.

DR. P. P. CLAXTON, recently United States commissioner of education, has accepted the provostship of the University of Alabama.

SECRETARY WEEKS, of the Department of War, has asked the University of Pennsylvania to release Major General Leonard Wood from his promise to become provost of the university in order that he may be free to accept the governor generalship of the Philippines.

As an *ad interim* measure, Dean Stanley Coulter has been appointed chairman of the faculty of Purdue University by the board of trustees and will administer all academic interests, while financial matters will be handled by a member of the board.

DR. CHARLES D. SNYDER has been appointed professor of experimental physiology in the Johns Hopkins University.

DR. JOHN C. DONALDSON has accepted appointment as assistant professor of anatomy in the school of medicine of the University of Pittsburgh.

DISCUSSION AND CORRESPONDENCE
ANOTHER HIGH-TEMPERATURE RECORD FOR GROWTH AND ENDURANCE

A TEMPERATURE record for growth and endurance of developing joints above that of any previously given was published by the senior author in SCIENCE for April 15, 1921. Young joints of *Opuntia* were found to continue elongation at 55° C. (131° F.) and to endure this temperature so that development was continued normally at lower and accustomed temperatures in March at the Desert Laboratory.

Measurements on other individuals with the advance of the season confirmed the earlier

results and have established a new high-tem-
perature limit for active protoplasm in higher
plants, also a new endurance record. The
principal facts are as follows:

1. Joints of *Opuntia* were observed to main-
tain a fair rate of enlargement when at a
temperature of 56.5° C., the air surrounding
them being at 58° C. (137° F.).

2. Growth of young joints of *Opuntia* the
temperature of which rose to 62° C. (144° F.)
in an air temperature of 63° C. (146° F.)
stopped and some shrinkage ensued, but growth
or enlargement was resumed when their tem-
perature fell to 50° C.

3. The young joints which were subjected
to these temperatures were about 15 to 20 mm.
in width and 25 mm. in length, and after being
held at or near the record temperatures for
an hour or more, which was repeated in one
case, carried forward normal development,
reaching maturity at a normal average of 100
mm. in width and 130 mm. in length.

4. It is to be noted that data from observa-
tions in which temperatures were taken from
the air or from water in which the roots or
aerial parts of plants were immersed, have
but little value in any estimation of the work-
ing temperature of active protoplasm by reason
of the abnormal hydration and transpiration
conditions introduced. These conditions as
well as the proportions and state of the main
colloidal components must determine the tem-
perature effects.

D. T. MacDougal,
Earl B. Working

Desert Laboratory,
Tucson, Arizona

A CALCULATOR FOR CONVERTING GAS CHAIN VOLTAGE INTO EQUIVALENT C_{H_+} OR p_H VALUES

In the determination of hydrogen-ion con-
centrations by electrometric methods employ-
ing the hydrogen electrode, the step of find-
ing the C_{H_+} or p_H value from the measured
voltage, with the aid of the working formula,
though not difficult, is time-consuming. The
extensive tables of Schmidt and Hoagland[1]

[1] Univ. of Cal. Pub. in Physiol., 5, 23, 1919.

simplify the process considerably. They give,
in parallel columns, the voltages measured be-
tween a hydrogen electrode and a tenth-nor-
mal, and between the hydrogen electrode and
a normal calomel electrode, respectively.
With these are given the corresponding p_H,
C_{H_+} and C_{OH_-} values, respectively. If the
calomel electrode — because of difference in
concentration of its potassium chloride solu-
tion, for example — has a different value,
against the normal hydrogen electrode, from
those assumed in these tables, a simple com-
putation is necessary.

By definition, $p_H = - \log C_{H_+}$, and the
working equation, derived from Nernst's
equation, shows these quantities to be linearly
proportional to the measured voltage. If in
all cases we had to deal with a single unvary-
ing reference potential, the simplest proced-
ure would be to draw the straight line, ex-
pressing the relationship, on a chart of rect-
angular coordinates, and to use this as the con-
version chart. This plan, however, is not
practicable in its application to all cases, be-
cause of the preferences of different workers
for different types of reference electrodes.[2]
Some prefer the tenth-normal, others the nor-
mal, still others the saturated type. In any
given type, there are likely to be minor differ-
ences between different electrodes. To be able
to apply the graphic chart to all cases requires
that the straight line be capable of being
shifted, parallel to itself at any one tempera-
ture, to correspond to the fundamental poten-
tial of the reference electrode being used.

Since it is a straight line relationship with
which we are dealing, and since the varia-
tions mentioned do not change the slope of
line, an instrument of the slide-rule pattern
is not only feasible, but highly practicable.
For convenience, the circular type was chosen.
The C_{H_+} and p_H scales are engraved on a
disk 125 mm. in diameter. From the relation
between these two quantities, their main divi-
sions coincide; e.g., for $p_H = 8$, $C_{H_+} = 10^{-8}$.

[2] A graphic conversion chart of the kind men-
tioned is reproduced in "Electrometric Methods
and Apparatus for Determining Hydrogen-ion Con-
centrations," L. & N. Co., 1920, p. 25.