the state is iron, of which a small quantity (less than 500,000 tons of ore in 1913) is mined. In addition, however, to being the premier state in the production of coal, Pennsylvania leads also in the manufacture of cement, the burning of lime, and the production of mineral paints, sand, slate and stone. It is second in the value of clay products and natural gas, and sixth in the production of petroleum. Although not an iron-ore state, Pennsylvania is by far the leading producer of pig iron, which is obtained from the Lake Superior ores. The production in 1913 was 12,871,349 long tons, valued at $197,726,314. If the value of the pig iron made in Pennsylvania were added to the value of the other products of the state, the total values for 1913 would have exceeded $700,000,000, which is more than one fourth of the value of the total mineral production of the United States. The production of coal in Pennsylvania in 1912 amounted to 246,227,086 short tons, valued at $346,993,123; in 1913 the value was $388,220,933, an increase of $41,227,810, or 12 per cent., over 1912. Second in importance among Pennsylvania's mineral industries is the manufacture of Portland cement, closely followed by the clay-working industry. The production of cement in 1913 was 28,060,495 barrels, valued at $24,268,800, against 27,625,340 barrels, valued at $18,945,835, in 1912. The value of the clay products, exclusive of raw clay mined and sold, increased from $21,537,221 in 1912 to $24,231,482 in 1913. Although ranking second in the total value of its clay products, Pennsylvania is first in the production of brick and tile. A large part of the fire clay is mined in connection with coal mining and becomes in reality a by-product of that industry.

UNIVERSITY AND EDUCATIONAL NEWS

MR. W. K. VANDERBILT has given $135,750 toward the purchase by Columbia University of a half block of land on 117th Street adjoining other land owned by the university.

THE University of Pennsylvania receives $50,000 by the will of Miss Anna Blanchard of Philadelphia.

THE late Dr. Morris Longstreth, who at one time held the chair of pathological anatomy in Jefferson Medical College and later was in practise at Cambridge, Mass., and Barcelona, Spain, made the College of Physicians of Philadelphia his residuary legatee.

THE annual dinner of the faculty and managers of Haverford will be held on November 23, when questions relative to the curriculum and the general policy of the college will be discussed.

DR. WILLIAM WADDELL BOYD was inaugurated president of the Western College for Women, Oxford, Ohio, on November 4. His inaugural address was entitled "The Intelligent Use of the Intellect."

A CABLEGRAM to the N. Y. *Sun* states that M. Henri Bergson, presiding at a meeting of the Academy of Moral and Political Sciences on November 7, announced that Arthur Raffalovitch, Russian privy councillor and attaché of the Russian Embassy in Paris, a correspondent of the academy, has given his library, which he has been collecting for thirty years, to the University of Louvain. M. Bergson added that a committee is being formed to reconstitute the library's funds. It is known that the Germans removed the most precious manuscripts before burning the library, so it is hoped that the treasures eventually will be restored to Louvain.

THE Medico-Chirurgical College of Philadelphia has, according to the *Journal* of the American Medical Association, made the following faculty changes: Dr. Herbert H. Cushing, professor of practical anatomy; Dr. Ardrey W. Downs, professor of experimental physiology; Vernon K. Suydam, professor of physics; Charles E. Vanderkleed, professor of analytical chemistry; Dr. John H. Small, associate professor of bacteriology; Dr. Eugene A. Case, associate professor of pathology; Dr. Philipp Fischelis, associate professor of histology and embryology; Dr. Guy Hinsdale, Hot Springs, Va., associate professor of climatology; Dr. Arthur C. Morgan, associate professor of medicine, and Dr. John Stewart Rodman and Dr. John J. Gilbride, associate professors of surgery.

Dr. Johannes Meisenheimer, associate professor at Jena, has been elected professor of zoology at Leipzig, to succeed the late Professor Chun.

Dr. Paul Koebe, associate professor at Leipzig, has been elected professor of mathematics at Jena, as successor of Professor Johannes Thomae.

DISCUSSION AND CORRESPONDENCE

SUNFLOWER PROBLEMS

Professor Bateson, in his British Association address (Science, Aug. 28, 1914, p. 300), has raised the question whether the red sunflower may not owe its chestnut color to the loss of an inhibitor, instead of the positive addition of a factor for red. Are all yellow-rayed sunflowers potentially red, but prevented from becoming so by something which "stops down" the series of chemical processes which would produce redness?

So far as I can determine, the cultivated *Helianthus annuus* is derived from the wild *H. lenticularis,* which has a dark disc and orange rays. The disc florets of this plant have small triangular lobes, which are a sort of dull wine red owing to an abundance of anthocyan pigment. The rays are orange, without red. The disc bracts have dark red ends. There is evident anthocyan pigment in the stem, producing a mottled effect. Thus, it is clear that the *kind* of pigment which characterizes the red sunflower is rather abundantly present in the wild plant, although it does not invade the rays. Occasionally, however, the rays show a little red. At Longmont, Colorado, August 30, 1914, I found a plant of *H. lenticularis* having the middle third of the rays beneath with the apical half variably light brownish-red. Microscopic examination showed cells with anthocyan, which became redder with acid. On the upper side, the rays were entirely orange as usual. In the red sunflowers, it is this middle tract of the under side of the rays which is generally especially heavily pigmented. Had this Longmont plant a special "factor for red," or had some of the effects of the normal reddening factor of the disc florets spilled over, as it were, on to the rays? In our red sunflowers, we find that the heterozygous forms may be very richly colored. Nevertheless, they may be almost wholly yellow-rayed. The most extreme case of this sort is a plant grown this year, which has very purple stems and branches, but the very rich orange rays apparently wholly without red, though a lens shows a little scattered red. In this case it would seem natural to think of the red being inhibited. However, the appearance of yellow-rayed heads at the end of the season on heterozygous more or less red-rayed plants suggests not so much the late development of a special inhibitor, as the failure under adverse conditions of the color-producing mechanism. In other words the "inhibitor" here is nothing more than the withdrawal of the needful stimulus.

The monocephalous garden sunflowers have the disc yellow, the red having disappeared from the disc florets. The same variation occurs from time to time in the related wild species (*e. g.,* the variety *phenax* of *H. petiolaris*). Dark disc is strictly dominant or epistatic to yellow. Here we naturally speak of the loss of a factor; but carrying the inhibitor postulate a little farther, we can assume that we have here a second inhibitor, acting upon the disc, only operating when the plant is homozygous for it. A supposition of this sort is certainly fatiguing to the imagination.

In homozygous red-rayed sunflowers, the pigmentation may be intense.[1] We not only have the form (var. *ruberrimus,* nov.) with the rays deep chestnut red all over; but this year we obtained one (var. *niger,* nov.) with the rays practically black above, slightly red apically, though beneath they showed on one side a streak of orange. (The orange streak on one side, not always the same side, beneath, is a regular character of the very red varieties. I am not at present able to explain this asymmetry, unless it has to do with the manner

[1] It is singular that the pigmentation of the seed (fruit) follows quite different lines. Sutton's tall primrose variety of *H. annuus* has long black seeds, and in a cross with brown-seeded varieties, the seeds of F_1 come broad and dark brown.