fifths of the whole region is used for corn-culture, while the northern and western limit covers those districts in which not more than one-half of the improved lands is used for this cereal. On the whole, the climate of the corn zone is not favorable to wheat, as the summers are too hot, and have too much rain. Notwithstanding this fact, the great centre of American wheat-production is situated in this region, south of the Great Lakes. It is remarkable, that, notwithstanding the great total amount of precipitation, excessive dryness in any part of the period of growth of the plant causes poor crops, long periods of clear weather being interrupted by sudden violent showers of rain. Besides this, the rapid increase of temperature in spring is not favorable to the development of wheat.

The northern zone is divided into two sections, — that of wheat, and that of oats. An important line in this region is the southern limit of summer wheat, as those countries in which only summer wheat can be grown have serious disadvantages as compared to others. As all the sowing has to be done in spring, the amount of work at this season is so great as to make the introduction of the most profitable methods of culture impossible. Owing to the severity of our winters, this line runs far more southerly than in Europe. Starting from Boston, it crosses Massachusetts, northern New York, and Ontario. It reaches the 45th parallel in Michigan, and in the prairie region descends to 38° and 39° north latitude. North of this line, only summer wheat can be grown. This region includes almost the whole arable prairie region, and the whole Dominion of Canada with the sole exception of southern Ontario. In the eastern portion this line coincides with a temperature in January of 18° F., while in the western part of the country it coincides with that of 30° F. This difference is principally founded on the difference of snowfall in those regions. While the Eastern States are covered with deep snow, the prairies have no such protection, and the dry, cold winds of winter kill the young plants.

One of the most remarkable features of the wheat area is its great extent northward in the central parts of our continent, where a clear summer favors its cultivation. The same climatic peculiarity accounts for the existence of the Genesee wheat region of central New York. Wherever the amount of precipitation in summer exceeds 50 centimetres, oats are cultivated in preference to wheat.

Finally we have to consider the Pacific coast strip. In the large valleys of California and Oregon the summers are warm, but not moist enough for the extensive cultivation of corn and cotton; while farther north the precipitation is sufficient, but the temperature too low. It is true that in a few districts of California, and also in Oregon and Washington Territory, corn is the third in importance among the cereal products; but, taken as a whole, only three per cent of the total area is applied to its cultivation. In southern California excellent crops of corn are obtained by means of irrigation.

In California and Oregon, and in that part of Washington Territory situated east of the Cascade Range, the culture of wheat is by far the most important. In California and Oregon seventy per cent of the cultivated area is used for growing wheat, a figure which is equalled only in Minnesota. The clear and dry summer favors wheat more than any other plant, a sufficient amount of humidity being retained in the ground after heavy winter rains. In southern California the cultivation of wheat requires irrigation. Second in importance is barley, which in California occupies twenty-three per cent of the cultivated area; farther north the rainfall increases, and oats take the place of barley; and still farther north barley-culture is more important than even that of wheat.

Taken as a whole, about one-half of the continent of North America is arable land, about thirty per cent belonging to the polar regions, while twenty per cent is arid land, or mountainous, rocky regions. The agricultural region includes one of the countries best adapted to the production of cotton and corn, while the climate of the same region excludes other cereals and the vine. The development of the wheat region, although very rapid, is hampered by numerous disadvantages, — severe winters, rapid increase of temperature in spring, sudden variations of temperature, late frosts in spring and early frosts in the fall, and frequent draughts impair its value, while the dryness of the early fall favors the culture. On the whole, the climate is not as favorable to the growth of wheat as that of Europe. If, notwithstanding this fact, the wheat-production of the North-west has reached the enormous importance it has actually attained, the reason must be looked for in economic more than in agricultural considerations. The rapid colonization of the prairie regions, their easy cultivation, and the great natural highways of our continent, have given it the importance it possesses at present. But it would be erroneous to believe that this development will continue, that the amount of wheat produced and exported will indefinitely increase. When the tillable land has been taken up, and no new areas of productive land are added to the old ones, the economic reasons which have made the North-west the great granary of the world will cease, and the development will take another course, yielding greater returns from the same area than are possibly attained by the present wheat-culture.

NOTES AND NEWS.

THE director of the United States Mint, in his annual report to Congress, says that the gold product of this country for the year 1888, was 1,644,927 ounces, of the value of $33,175,000. This is about the same as in 1887, being an excess of only $175,000. The silver product was 45,783,632 fine ounces, of the commercial value of about $43,000,000, and of the coining value of $59,195,000. This is an increase of 4,515,327 fine ounces over the product of 1887. In addition to the product of our own mines, some 10,000,000 ounces of silver were extracted in the United States from foreign ores and bullion, principally Mexican. The coinage of the mints during the year was as follows: gold, $31,380,808; silver dollars, $31,990,833; subsidiary silver, $1,034,773; minor, $912,201; total, $65,318,615. The import of gold bullion and coin was $11,031,941, and the export $34,619,667, a loss by export of $23,587,726. The import of silver was $21,592,062, and the export $29,895,222, a loss by export of $8,303,160. The metallic stock of the United States Jan. 1, 1889, including bullion in the mints awaiting coinage, is estimated to have been, gold, $705,061,975; silver, $403,516,756; total, $1,108,578,731.

— Dr. Chaillé, the well-known statistician, states that the average life of woman is longer than that of man, and in most parts of the United States woman's expectation of life is greater.

— A correspondent of the New Orleans *Medical and Surgical Reporter* says that petroleum-oil is almost universally used by the artisan and poorer classes in London as an illuminant, and the number of accidents which occur yearly with these lamps is very large. Mr. R. W. Brownhill has invented an ingenious prepayment gas-meter, based on the principle of the cigar, coffee, and other automatic supply-stands to be seen in every railway-station in London. It consists of a small attachment, which can be applied to any meter, and which will cause the gas to be delivered in definite quantities as paid for by pence dropped into a box. All that has to be done is to drop in a penny and pull a small handle, when sufficient gas for the supply of an ordinary burner for six hours will be delivered from the meter. Any number of pennies may be placed in the box, one at a time, up to 143, the handle being pulled after each penny, which would insure 858 hours' gas to one burner, or a shorter supply to several.

— Carl Zeiss, whose fame as a manufacturer of microscopes and microscopical lenses is world-wide, has just died at Jena, at the age of seventy-three.

— A flume fifty miles in length has just been completed at San Diego, Cal. It is intended for irrigation purposes and water-supply. The reservoir in the mountains, whence the water is supplied, is 4,500 feet above sea-level.

— Dr. O. J. Broch, at one time professor of mathematics at Christiania, and later minister of the Board of Trade in Norway, who more recently acted as director of the International Bureau of Weights and Measures at Paris, died at Sèvres, Feb. 5, at the age of seventy-one. It has been the especial duty of the bureau, over which Dr. Broch presided from its creation after the Metric Convention of 1875, to construct new standards of the metre and kilogram for the different countries which were parties to that convention. At the time of his death all these standards had been constructed, and were only awaiting final approval at Sèvres before their delivery this year to the several contracting States.

— Agassiz Association, Chapter 949, New York City (Z), held its third annual exhibition of natural history collections, microscopes, electrical apparatus, etc., on Saturday, March 2, 1889, at 49 West 20th Street, near Sixth Avenue, from 3 to 6 P.M., and from 7 to 10 P.M.

— The ship-canal which is to connect Manchester, England, with Liverpool, is being rapidly constructed, ten thousand men and a great number of steam excavators being engaged upon it. The canal will be thirty-five miles long, twenty-six feet deep, and a hundred and twenty feet wide at the bottom.

— Rev. Arthur C. Waghorne, New Harbor, Newfoundland, has published "A Summary Account of the Wild Berries and other Edible Fruits of Newfoundland and Labrador."

— The exercises of the centennial celebration of Georgetown University, Washington, D.C., closed, Feb. 22, with a session in Gaston Hall, at which the honorary degrees were conferred by President Cleveland. Three gold medals were struck in honor of the occasion, which were awarded as follows: one to John Gilmary Shea, LL.D., the historian of the Catholic Church in America, for his work, "The Life and Times of Archbishop Carroll;" a gold medal, struck by the Alumni Association, presented to his Eminence James Cardinal Gibbons, for the archi-episcopal see of Baltimore; and a gold medal, like the preceding, to the President, Grover Cleveland, for the Government of the United States.

— A meeting was held, Jan. 31, in the meeting-room of the Royal Society, London, the Right Hon. Lord Rayleigh, Sec.R.S., in the chair, for the purpose of promoting a project, set afoot by some of the leading men in Munich, of erecting in that city a statue of George Simon Ohm, — a man who, although he discovered no new phenomena of very striking importance, yet by the accuracy of his thought, and the clearness of his insight into the true bearings of physical facts, was able to lay one of the principal and firmest parts of the foundation of modern physics. The occasion for the proposal at this particular time is the near approach of the hundredth anniversary of Ohm's birth, on March 16, 1789.

— The fourteenth annual commencement of the American Veterinary College was held at Chickering Hall, New York, Monday evening, March 4.

— At the meeting of the Royal Meteorological Society, Feb. 20, a report on the helm-wind inquiry was made by Mr. W. Marriott, F.R. Met. Soc. The helm wind is peculiar to the Cross Fell range of mountains in Cumberland, which runs from north-north-west to south-south-east. This range is high and continuous, and is not cut through by any valley. Cross Fell is 2,900 feet above sea-level. From the top of the mountains to the plain on the west, there is an abrupt fall of from 1,000 to 1,500 feet in about a mile and a half. At times, when the wind is from some easterly point, the helm forms over this district, the chief features of the phenomenon being the following: a heavy bank of cloud rests along the Cross Fell range, at times reaching some distance down the western slopes, and at others hovering just above the summit, while at a distance of two or three miles from the foot of the fell a slender roll of dark cloud appears in mid-air, and parallel with the helm cloud: this is the helm bar. The space between the helm cloud and the bar is usually quite clear, while to the westward the sky is at times completely covered with cloud. The bar does not appear to extend farther west than about the river Eden. A cold wind rushes down the sides of the fell, and blows violently till it reaches a spot nearly underneath the helm bar, when it suddenly ceases. The observations that have been made in the district during the past three or four years show that the helm wind is not such a rare occurrence as it was popularly supposed to be, the bar having been observed on 41 occasions in 1885, 60 in 1886, and 19 in 1887. The phenomenon takes place usually when the sky to the eastward is covered with cloud.

— Two large hydraulic canal-lifts have been recently erected at Fontinettes, on the Neuffossé Canal, in France, and at La Louvière, on the new Central Canal, in Belgium. They both consist of two counterbalancing troughs, resting on central hydraulic rams, 6 feet 6¾ inches in diameter, and moved by an excess of water introduced into the upper trough, and by hydraulic machinery supplying water to the presses under the rams to aid the ascent. The troughs at Fontinettes are each 129 feet 7 inches long, 18 feet 4½ inches broad, and contain 6 feet 6¾ inches depth of water, so as to be available for vessels of 250 tons. The troughs at La Louvière are 141 feet long, 19 feet wide, and hold water to a depth of 10⅝ feet, being designed to admit vessels of 400 tons. The total weight they lift is 785 tons at Fontinettes, and 1,037 tons at La Louvière, while the heights of the lifts are 43 feet and 50½ feet respectively.

— Professor Baker of the Illinois University says in a letter to the *Clay Work* on the sustaining strength of brick-work, "By actual experiments in a testing-machine, the average strength, from fifteen experiments, of piers laid in ordinary brick and common lime mortar, using the same care as that with which ordinary brick masonry is built, stood a few pounds (I am writing from memory) over 1,500 pounds per square inch, which is equal to 216,000 pounds per square foot, or the weight of a column of brick 2,000 feet high; with ordinary Portland cement mortar, the strength was, for a mean of eight experiments, 2,500 and some odd pounds per square inch, which is equal to 360,000 pounds per square foot, or the weight of a column of brick masonry 3,600 feet high."

— The naval board charged with the duty of supervising and reporting upon the test of the 15-inch pneumatic gun last January have just made their official report to the secretary of the navy, who pronounces it satisfactory. The report is to the effect that more than one-half the projectiles, fired at ranges of 300, 1,700, and 2,100 yards, fell within the specified target limits, an area of fifty by a hundred and fifty feet.

— The annual address of the president of the New York Microscopical Society, Charles F. Cox, read Jan. 4, 1889, was on "The Spontaneons Generation Theory, and its Relation to the General Theory of Evolution." The close of the address was as follows: "In the domain in which Mr. Darwin worked, I look upon natural selection as a well-established principle. In the developmental idea as extended and expounded by Herbert Spencer, I find much that appeals strongly to my sense of fitness and consistency, and, if possible, I could see the hypothesis become a proven law of nature without a shock to my mental or moral status. I have no fear of any thing that is true. But what I have endeavored to show is, (1) that a transition from not-living matter to living forms is an essential step in the process of evolution; (2) that at the point at which experimental proof is applicable (namely, to present and continual archebiosis), the theory of such a transition is discredited, if not disproved; (3) that scientists generally accept this conclusion, and that those who are not thorough evolutionists are confined to the mere belief that the step from the not-living to the living was taken at some remotely early period, beyond the reach of evidence. And finally, I submit, as a consequence of these premises, that the general theory of evolution is still in the stage of hypothesis, and that in the gap between lifeless substances and living forms we have the veritable 'missing link.'"

— Thanks to strict preservation, and to the fact that the inhabitants are realizing the value of the bird, according to *Nature*, the eider has greatly increased in number in Iceland during recent years. The people do all in their power to attract the bird to their property. Among these attractions are bells worked by the wind or by water, the hanging-up of dress material of a glaring color, and the keeping of brightly colored fowls. A society has been formed for the granting of premiums for the killing of animals preying upon the eider, and last year 1,155 such prizes were awarded.

— In a late number of *L'Architecture*, M. Edmond Pottier contributes a letter on antique polychromy, combating the idea that a Greek temple was an edifice painted in every part, from the steps to the cornice, which appears to be entertained by some French archæologists. He observes that no monument, except the temple at Ægina, offers traces of color on the shafts of the columns, and that a comparison cannot be instituted between that case and such a building as the Parthenon, inasmuch as the latter was in marble and the former in porous stone, to which it might have been thought desirable to give a surface finish of paint, without implying that the same treatment would be applied to marble.