Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT
NO. 37 PARK ROW, NEW YORK.

O. D. MUNN. A. E. BEACH.

TERMS FOR THE SCIENTIFIC AMERICAN.

One copy, one year, postage included..... **$3 20**
One copy, six months, postage included..... **1 60**

Clubs.—One extra copy of THE SCIENTIFIC AMERICAN will be supplied gratis for every club of five subscribers at $3.20 each; additional copies at same proportionate rate. Postage prepaid.

The Scientific American Supplement

is a distinct paper from the SCIENTIFIC AMERICAN. THE SUPPLEMENT is issued weekly; every number contains 16 octavo pages, with handsome cover, uniform in size with SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, $5.00 a year, postage paid, to subscribers. Single copies 10 cents. Sold by all news dealers throughout the country.

Combined Rates.—The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for one year, postage free, on receipt of *seven dollars*. Both papers to one address or different addresses, as desired.

The safest way to remit is by draft, postal order, or registered letter.

Address MUNN & CO., 37 Park Row, N. Y.

☞ Subscriptions received and single copies of either paper sold by all the news agents.

VOL. XXXVI., No. 9. [NEW SERIES.] *Thirty-second Year.*

NEW YORK, SATURDAY, MARCH 3, 1877.

Contents.

(Illustrated articles are marked with an asterisk.)

TABLE OF CONTENTS OF
THE SCIENTIFIC AMERICAN SUPPLEMENT,
No. 61,
For the Week ending March 3, 1877.

MUNN & CO., PUBLISHERS,
37 Park Row, New York.

☞ Single copies of any desired number of the SUPPLEMENT sent to any address on receipt of 10 cents.

PUBLISHERS' NOTICE.

New subscriptions to the SCIENTIFIC AMERICAN and the SCIENTIFIC AMERICAN SUPPLEMENT will, for the present, be entered upon our books to commence with the year, and the back numbers will be sent to each new subscriber unless a request to the contrary accompanies the order.

Instead of a notice being printed on the wrapper, announcing reached subscription is about to end, the time of expiration is subscriber in the printed address each week, so that the subscriber may see when the period for which he has prepaid is about to expire.

SCIENCE PROPHESIES THE FUTURE OF THE RACE.

M. Alphonse de Candolles is to be credited with the strikingly original idea of applying the principle of the Darwinian theory to determine, not the past, but the future of the human race. That principle he defines as "the forced adaptation of organized beings to surrounding circumstances of every kind, the result of which is that the modifications preserved are sometimes good, sometimes bad, that is, according to our human conception of what is good or bad." Reasoning from the truths determined as to the past history of the world as demonstrated by geology, and from the known records of the origin and progress, extinction or growth, of the various types of mankind which have existed or now exist upon the earth, he deduces a logical conception of life on our planet centuries hence.

The argument presented is based on these premises; first, that organized beings endowed with will and the faculty of locomotion always seek to adapt themselves to their environment, and none do so more effectually than man, because of his superior intelligence. Secondly, that those individuals least able thus to accommodate themselves are most likely to perish, and hence populations are principally recruited by individuals that possess the qualities best adapted to the circumstances of the country and the age in which they live. Thirdly, that the violent contests between nations and individuals accelerate modifications and adaptations to new circumstances. It will be evident that, in considering the subject, two possible conditions of the race at once present themselves, or rather two questions are before us to answer: What will be the state of mankind one thousand years hence, during which period it is reasonably certain that the physical conditions which affect the species will remain stable? And what will be the state of mankind several hundred thousand years in the future, when vast cosmical changes may possibly have occurred?

The period of one thousand years is an extremely short one in the earth's history. We have historic documents dating even further back; and since their origin, no material change in climate has taken place, nor have the configurations of the globe altered. The supposition of a continuation of present physical conditions during several generations of man is thus presumable; and such being the case, two phenomena may be foreseen, namely: The land will be more thickly inhabited, for everywhere the population is increasing and seeking new places of abode; and as a consequence, there will be more frequent mingling of races. Conformably to the doctrines of natural selection and survival of the fittest, the weaker races must then either be destroyed or absorbed by the stronger ones. This is already taking place with the Indians, the Australians, the Hottentots, and other aboriginal tribes. There are three great races, however, endowed with admirable qualities for invasion, which will mix with the inferior races more or less, according to circumstances. These are the white race, represented by the Europeans and their American descendants, the yellow race or Chinese and Japanese, and the negroes. The whites have the advantage of intelligence and ability to bear cold climates; but they cannot endure tropical heats. Negroes possess physical vigor; but as regards bearing cold and heat, they are the reverse of the whites. The Chinese can exist in all latitudes, but they lack courage and progressiveness. The mingling of the three races will therefore never be complete; and although, ten centuries hence, hybrid peoples of every degree will be found in Africa, in China, and in the north of Europe and America, the primitive races will predominate.

Before the far more remote period designated in the second question shall arrive, great changes may, as we have already intimated, occur. The entire habitable surface of the globe may be altered by the depressions and elevations of its surface, constantly, though slowly, in progress. New diseases may sweep off whole nations, or the race itself. The accumulation of ice at the poles may produce changes in winds, in currents, eventually in climate; and another glacial period may supervene, the effect of which would be to drive all organized beings toward the equator; and this change in habitation would result in the extinction of many species. Our entire solar system is moving with great rapidity in a certain direction. It may enter a warmer or colder part of the Universe, or the sun may blaze up and be destroyed, as did that other sun in the constellation of the Swan quite recently. But setting aside these hypothetical cases, let us see what Science predicts as absolutely certain:

Through the oxidizing action of the air and by human labor, the quantity of metals and coal on the surface of the earth is constantly being diminished. Undoubtedly as this occurs, new ways of working mines to great depth and of utilizing natural metallic oxides will be discovered; but these resources can never be so advantageous as those we now enjoy. As they become rare, so will population diminish and industries decrease; and this result will be the more marked in countries depending upon such resources. We know that the terrestrial surface is constantly diminishing, and elevated regions are being lowered through the incessant action of water, ice, and air. The earthy matter, washed or ground away, is carried to the sea, which is thus filling up. The result, however, will be a total submersion of the land as it now exists, and the destruction of all organized beings which live thereon or in fresh water. But the human species, because of its intelligence, will survive longest; and perhaps the last man will yield up his life on some isolated coral reef in the vast waste of water. Before this extreme period is reached, however, as the treasures of the earth disappear in certain localities, people will seek them elsewhere; and thus the races will congregate in masses on smaller areas of terrestrial surface. This concentration will be enforced by other causes, as, combustibles and metals being scarce, intercommunication will be difficult; through the depression of mountain chains diminishing the condensation of aqueous vapors, now fertile countries will become sterile, and populations will accordingly diminish. Then, as the continents deprived of mountains become partial deserts or archipelagoes, the people will become more and more maritime. They will draw their sustenance from the sea, which will form a barrier to the mingling of races. The whites who will avoid equatorial regions will suffer most from ice invasions from the poles; and the colored races in the central archipelagoes, remaining pure as at present, on account of natural selection during their long isolation, will probably be the survivors of the race.

To recapitulate, M. de Candolles believes that our period and that which will follow for the next thousand years will be characterized by a great increase in population, a mingling of races, and a prosperity more or less marked. Then will probably follow a long period of diminution of population, of separation of the peoples, and of decadence.

A GOOD POLICY.

A very handsome compliment has just been paid to the United States by the Secretary of the Geological Society of Edinburgh, Scotland. Writing under date of January 20, to announce the election of Professor F. V. Hayden as Foreign Corresponding Fellow, the secretary justifies the defence of American science by Dr. Draper (see SCIENTIFIC AMERICAN, page 360, vol. xxxv.) and says: "I am glad to take this opportunity of stating that, in the opinion of myself and my scientific friends in this city, no government in the world equals that of the United States in the liberality, importance, and, I may add, magnificence of its donations to scientific societies throughout the civilized globe. Beside it the liberality of the British Government, even to British societies, sinks into insignificance."

This is as it should be. It is the very best policy of a government like ours to favor Science in every legitimate way. As a people, our indebtedness to Science at home and abroad is simply immeasurable. It has furnished the true basis of our national culture. It has made our agriculture what it is—the source of national wealth and strength. It has enabled us to become the great manufacturing country of the world, and has done more to further the speedy development of our mineral and other material resources than any other agency. We do well therefore to deal liberally with Science at home and to be lavish rather than niggardly in distributing abroad the results of our scientific surveys and experimental investigations.

This policy is particularly worthy of encouragement at this present time. Hitherto no effort has been spared to aid and encourage emigration: with what success and profit may be seen in our rapid increase in wealth and population, and in the rapid conquest of vast areas lately a wilderness, now overspread by fertile farms, dotted with thrifty towns and rising cities, knit together by railways and telegraph lines. The time has come, however, when our need is not so much empty handed emigrants, however stout and willing to work, as men of a higher intellectual and financial grade, men with capital to invest, men capable of taking a more important part in the discovery and development of our material resources. The old world is full of men of this sort, men of culture and enterprise, with money to sustain both, who are on the outlook for opportunities for the exercise of their talents. There is no better way to reach such men, and give them a favorable impression of our country and people, than to be well represented at all the local centers of activity and culture. Our government publications are replete with matter of great interest and value; and it is a wise policy which secures their distribution among the libraries of the world, particularly among those of the scientific societies. There is that scattereth, and yet increaseth: and the converse is equally true, as the same ancient experience discovered. There is that withholdeth more than is meet, but it tendeth to poverty.

It is to be hoped that the ostentatious economy (?) that broke out in Washington awhile ago will pass away before this relatively inexpensive yet profitable policy, in dealing with Science at home and abroad, is completely reversed.

PROTECTION OF BUILDINGS FROM LIGHTNING.

Under this head, the English journals publish an abstract of a paper by Professor J. Clerk-Maxwell, which is likely, on account of the high reputation of its author as a scientist, to disturb the minds of many who have no very clear conception of the nature of electricity. The Professor states first that it appears to him that the extension of a lightning conductor above the highest part of a building, connected at its lower extremity with conducting strata underground, and thus tapping the electricity, is calculated rather to protect the surrounding country, and to relieve the clouds, than to protect the building.

This idea is in direct conflict with experience, which has taught us that buildings protected by well constructed lightning rods are never damaged, but that the surrounding buildings have often been struck; and hence we have the well established maxim that the protecting influence of a lightning rod extends around it in a radius of 50, 100, 150, or more feet, according to the height of the rod, and other incidental circumstances sometimes difficult to define. Whenever a house provided with a lightning rod has been