Scientific	American.
ESTABLISHED 1846.	

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

NO. 87 PARK ROW, NEW YORK.

TFIC AMERICAN.
8.
luded
upplement.
MERICAN, but of the same size, ar edition.
ples of either paper sold by all
RIES.] Thirty-first Year.
AUGUST 26, 1876.
with an asterisk.)

Contents.	
(Illustra.ed articles a	e marked with an asterisk.)
t malgamating apparatust	131 Morter bright red (5) 130
A malgamating apparatus"	131 Mortar, bright red (5) 139 133 Nail exhibit, Swedish* 134
Angle circle, glass	122 Naval itama
A nime photo process	133 Naval Items. 137 131 New books and publications. 137 139 Nitrate of silver stains. 137
Annihals, the resources of	120 Nitrato of cilver stains 127
Aquarium, a marine	135 Oil pipe 300 miles long
bleaching by alum saits	190 Organ vinew stal
Bleaching sponge	124 Petenta American and foreign 197
Blue color, new	190 Patenta for coode and plantars 194
Boats, paddlewnceis for (6)	139 Patents, official list of
	131 Pencil writing, copying (27) 139
Jarbon disulphide, puritying	133 Pendulum, compensating
arpet, what is an ingram	199 Dhatagraphic action ato 199
nemical dangers by light	10 Photographic action, etc
lder, bolling (25)	132 Photographic action, etc. 132 139 Photographs, magic. 133 139 Platinum and vanadium. 133 139 Platinum and vanadium. 133
lder, preserving (15)	100 Peteening by Vinginia anappan 121
olors and weak eyes (4)	139 Poisoning by Virginia creeper 134 140 Polishing in the lathe (8) 139
Concrete walls, etc., (51)	140 Potessium dishumata
Samp-proof buildings	140 FOIASSIUM dichromate
Dental gardening	140 Potassium dichromate
Echoes in school rooms (8)	105 I Fize for bleaching agent
gg holder"	131 Purple Cyanide dyestun, a 180
ingraving process, new	134 Ranway, the first Uninese
Tre arms, precon-loading	13) Furple cyalide dyestiff, a
Fire engine, etc., nand	127 Doolar mountains 100 of the ote 190
Fireproof dress	127 Rocky mountains, age of the, etc. 129 134 Rubber, dissolving (15)
Fruit preserving (1.)	139 Saw bot steel rolls 124
Coar wheels* (12)	133 Sheep dogs, training
Treenstones. New Hampshire	136 Silver chloride and light 132 128 Soap bubble solution
Juano artificial	128 Soan hubble solution 127
Juano hat	136 Sneech the development of 132
Hons as a photo preservative	136 Speech, the development of
Juxley's arrival, Professor	129 Straighten & shaft, how to 182
Hydrophobia, preventive of	129 Summer science
lettles. the	161 Sun's time, the (2)
amowick trimmer*	131 Tea stains on oak (25)
ead, handling (29).	14) Telegraphy, musical*
light and ferric chloride	133. Tohacco, coluting (36),
ight and silver	133; Tobacco, coloring (28)
light, the impact of	132 Vapor baths (22)
Light, what it is	132 Vinegar, claritying (17) 139
Locomotives, incendiary	129 Watches, cleaning (28)
Magnetism, attraction of (2),	133 Yapo Latts (22)
Man. physical. in America	128 Water, lime (22)
Marble, imitation	130 Water, mineral (22)
Marble, stains on (1)	139 Wells in houses (9) 139
Microscope screws (3)	139 Wells in houses (9) 139 139 Wool, mineral, curious change 127
······································	
THE SCIENTIFIC A	MERICAN SUPPLEMENT.
TTE SVIENTIETO A	

THE SCIENTIFIC AMERICAN SUPPLEMENT. Vol. II., No. 35. For the Week ending August 26, 1876.

TABLE OF CONTENTS.

- 1. THE INTERNATIONAL EXHIBITION OF 1876, with 37 figures.-Exhibits of the Hartford Boiler Inspection Company, 10 figures.-Valuable Information about Boilers.-Needle Machinery at the Exhibition, 2 figures.-Williamson's Hoist Machinery, 1 figure.-Bliss and Williams Exhibit of Power Presses,6 engravings.-Locomotives at the Exhibition, 18 figures, with Table of all Principal Dimensions of all Locomotives Exhibited.
- 11. ENGINEERING AND MECHANICS. With 6 engravings .-- The Railway Tunnel under English Channel, 1 engraving of the Shaft.-Railway Brakes .- Taking Up Water without Stopping .- Grattan's Pneumatic Telegraph, 2 engravings.-Fireproof Towns.-Pumping Exhaust Steam Back to Boiler.-Ice Skating in Summer.-The Glaciarium London.-Ice-Making Machine of the London Ice-Skating Rink, page engraving. -Loan Collection of Scientific Instruments.
- III. TECHNOLOGY. ETC.-Industrial Uses of Aluminium.-Process for Photo-Chromic Prints.-25 New Dyeing Recipes-Protection of Steam

PHYSICAL MAN IN AMERICA.

From time to time every great mercantile or manufacturing firm slackens the work of making and selling to review its position and possessions: as the phrase runs, to take an local causes, the general character of the inhabitants, their account of stock. Just now the American people are similarly engaged in taking stock.

We have had a hundred years of general prosperity, a hundred years of rapid growth in numbers, wealth, and power: and very properly we celebrate our Centennial year in reviewing the results of the years that have gone, in trying to learn our relative standing among the nations. Not only in the great sample show of our natural and industrial resources at Philadelphia, but everywhere throughout the land. are manifestations of the same laudable desire to discover just what we are worth as a nation, what the past has done for us, and what the prospect is for the future.

There is danger however that, with our absorbing interest in the things we have invented, discovered, and made, in our mental and industrial achievements, we may forget the more important item of national stability, what we are: in other words, the character and conditions of our physical manhood. How do we compare bodily with the citizens of more homogenious nations? How big are we, on the average : what is our condition as to health and disease : what is our working force, and how long does it hold out?

Questions like these are especially pertinent at this time; for what our country shall be during the coming centuries depends far more upon the physical character of the people than upon the things they have or the machines they use. It is fortunate that the material for such studies of physical man in America are ready at hand, thanks to the excellent use made by the Provost Marshal General's bureau of the records of examinations for military service during the late war, an elaborate digest of which has just been completed by Dr. J. H. Baxter, late chief medical officer of that bureau, and published by the United States Government. The records cover the physical examinations of more than half a million men, furnishing an amount of data largely exceeding in extent any of a similar nature ever before collected and published. And, as Dr. Baxter justly observes, the value of this enormous mass of statistical matter is hightened by the circumstances that it does not relate to soldiers already in the field, picked men in no wise representing the masses, but to the people: the men engaged in every occupation, professional men, and men of letters, in short, to all the citizens of the country, whether of native or foreign birth.

During the first two years of the war, the armies were recruited by volunteer enlistments, under the control of the State authorities. This method proving inadequate, Conof the war department to be known as the Provost Marshal General's, and to have charge of the recruitment of the armies, by enlistment or by draft as might be necessary. As a preliminary to the latter method, an enrolment of all persons liable to perform military service had to be made; and in order that none but able bodiedmen should be put in the field, a thorough and systematic medical examination of all of 605,045 men, of whom 155,730 were exempted, or a ratio | aims. of 257.39 per thousand. During the same period there were examined 225,639 volunteers and 79,968 substitutes. Of the former 50,008, or a ratio of 221.63 per thousand, and of the latter 21,125, or a ratio of 264 17 per thousand, were reiected.

Of these and other records, covering the examination of over a million men, nearly half were found more or less incomplete and were thrown out ; but as those which could be used seemed to be fair representatives of all, the omissions abridged the work rather than detracted from its value. The records made use of showed for each of the subjects of examination his age, nativity, residence, occupation, hight, complexion, color of eyes and hair, girth of chest at inspiration and at expiration, social condition (married or single), color, general physical constitution and condition, distinguishing natural or accidental mark if any, in case of acceptance, and specification of disease or disability in case of rejection. The scope of the final report is in the main the

esting matter, a connected and generally graphic account of each congressional district by a resident physician, covering its physical description, its prevalent diseases and their modes of life and occupations, the fitness of the different classes and nationalities for military service, and so on.

From these, in connection with the tables and colored charts, it is our purpose to draw much curious and valuable information for the entertainment of our readers : to sum up, so to speak, our physical assets and liabilities as a nation.

SUMMER SCIENCE.

We have received a periodical bearing the name "Appalachia," a rather mystifying title until one peruses the pages sufficiently to learn that the magazine is intended to be the report of results accomplished, plans proposed, and information gathered by the Appalachian Mountain Club, the object of which association is the thorough geographical. geological, topographical, zoölogical, and botanical study of the mountains of New England and adjacent regions. The required knowledge is to be obtained by systematic explora. tion conducted by the members individually: and one cardinal aim and object is the publication at some future time of " a detailed and accurate map of the White Mountains, upon a large scale and in the very best style of workmanship.

It seems to us that those who have organized this club deserve credit for a very sensible idea, and one that merits to be widely imitated. Camp life in the summer, as witness the throngs which yearly visit the Adirondack region in this State, is extremely fascinating, and generally a grand restorer of impaired health. Beside it offers to the hunter and fisherman the best opportunities for sport. Now a club with the objects above stated combines all the benefits of outdoor life, besides placing before its members a definite and useful aim, so that each individual mingles with his holiday relaxation work which, from its very novelty and variety, ceases to be labor, and yet is of sufficient importance to stimulate the best endeavors. We cannot imagine anything more enticing to the scientific student than a summer spent with such a club as the Appalachian. If his tastes incline to natural history, he has only to read Professor Sterry Hunt's admirable letter of instruction to know, as Faraday expressed it, just "what to look for." There are floral materials to collect, limits of altitude of trees, plants, and animals to be noted, nature and distribution of rocks to be observed, traders and business men of every grade, laborers skilled and rare and remarkable vegetable productions to search for, and unskilled, the rich and the poor, the robust and the crippled : so on through a long category. Does he desire a summer of practical surveying, Professor Hitchcock tells just what is to be done and how to go about it, gives a list of points to be determined, and even describes the needful instruments. The artist is offered an enchanting sketching tour, and Professor Fay explains how the knight of the brush and pencil gress passed an act, in the spring of 1863, creating a bureau can make himself scientifically useful. Professor Pourtales tells where original explorations are needed, and how they are to be conducted : lastly, Professor W. G. Nowell, for the benefit of those who do not care to be pioneers, suggests where paths may be made, record bottles placed, points of view to be cleared, and other improvements accomplished, which will facilitate the general work. It is original investigation conducted under the pleasantest conditions, and drafted men and volunteers was necessary. Four drafts | certainly well calculated to give those who undertake it a were made, the whole furnishing records of the examination zest for discovery which may stimulate them to higher

Beside, the task projected has a wider utility than is involved in its immediate result. There is a lamentable ignorance all over this country regarding our own territory, an ignorance which across the Atlantic becomes surprisingly dense, even among people otherwise highly educated. Our English contemporaries constantly quote American localities incorrectly; and to the minds of continental writers, our cities, counties, and States seem inextricably confused. In geography, as in all sciences, true knowledge has its foundation in details; and where those are clearly and accurately determined, we may look for generalizations based thereon to be equally correct. In the United States, the youth of the nation, and the fact that there are still portions of our immense territory wholly unexplored, are the obvious reasons why general information has been compiled without the substantial basis we have indicated; and many years will elapse before we shall have that intimate knowledge of our land which the marvelously minute topographical maps comparison of each of these elementary conditions with of Sweden, exhibited at the Centennial Exposition, prove others, and a consideration of their relation to disease. The that the Swedes have of theirs. Still we know of no better tables in which nativity is an element of the comparison | means of securing such useful information than by the of scientific students,

- 1V. ELECTRICITY, LIGHT, HEAT, ETC. Lightning Conductors.-Double Telemeter, 3 engravings .- Clamond's Thermo-Electric Battery.
- V. NATURAL HISTORY .- The Ocean's Bottom, 4engravings .-- Globigerina, Orbulina, Rhabdosphere.-Functions of Cerebrum.-The World's Alphabets, 5 engravings.-How Plants Feed.-Guarana.-Roscoelite.
- VI. MISCELLANEOUS .- Society of Antiquaries .- Shooting Stars, by Professor Young .- The Satellite of Venus.

The Scientific American Supplement

is a distinctive publication issued weekly; every number contains 16 oc-tavo pages, with handsome cover, uniform in size with SCIENTIFIC AMERI-CAN. Terms of subscription for SUPPLEMENT, \$5.00 a year, postage paid, to subscribters. Single copies, 10 cents. Sold by all news dealers through-out the country.

COMBINED RATES.—The SCIENTIFIC AMERICAN and SCIENTIFIC AMER-ICAN SUPPLEMENT will be sent together for one year, postage free to sub-scribers, on receipt of \$7.00.

TO SCIENTIFIC AMERICAN SUBSCRIBERS WHO WISH TO TAKE THE SUPPLE-MENT. — A subscriber to the SCIENTIFIC AMERICAN may change at any time to the SUPPLEMENT, or may have both papers sent to him, by remitting to us the difference between the amount already paid for the SCIENTIFIC AMERI-CAN and the SUPPLEMENT prices above mentioned. Remit by postal order. Address

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

All the numbers of the SUPPLEMENT from its commencement, January 1, 1876, can be supplied; subscriptions date with No. 1 unless otherwise or dered. if Single copies of any desired number of the SUPPLEMENT sent to any ddress on receipt of 10 cents.

show the physical condition of the foreign-born citizens of labors associated as in the various nativities in relation to each other, and to native club, which we trust may be but the precursor of others formed in other parts of the country. Americans, both white and colored.

The first fifteen tables, the anthropological series, treat of physical qualities without relation to disease : the remaining seven are pathological, treating of disease and its relation to the physical qualities of man, to occupation, and to locality. To facilitate the interpretation of the latter a number of maps showing by gradations of color the prevalence of disqualifying diseases together and singly, by congressional districts. In the letter press, the reviews of the tables call attention to what is most interesting and significant of the lessons they teach, and furnish an amount of information with regard to American manhood, physically con sidered, the relative healthfulness of different parts of the Northern States, the relation of health to employment, and so on, that is truly wonderful.

Another exceedingly valuable portion of the work is the usual coral rock in that it contained a large percentage of three or four hundred pages of Part III, containing reports phosphate of lime, the mineral base of Peruvian guano of examining surgeons. In these is given, with other inter. At first it was supposed that, by some mysterious chemistry

ARTIFICIAL GUANO.

The enormous value of the guano deposits of the Chincho and Lobos Islands naturally gave rise to an early and eager search for similar stores of agricultural wealth in other localseries of charts have been prepared, presenting to the eye the 'ities. And seeing that sea fowl were not less numerous and vomore interesting results deduced from the tables; also a racious on uninhabited islands the world over, there seemed to be no reason why the search might not be successful. But it soon became clear that climate had much to do in the matter. Only in rainless regions where the slowly accumulating layers of excrement, fish bones, dead fowls, and so on could remain undisturbed and undissolved was it possible for true guano to accumulate. The search for it, how. ever, was not without good results On many other islands, especially in the equatorial regions of the Pacific, there were found extensive beds of rock, which differed from the