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.

Clubs.-One extra copy of THE SCIENTIFIC AMERICAN will be supplied 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 octavopages, with handsome cover uniform in size with SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, 5.00 a year, postage paid, to subscribers. 10 cents. Sold by all news dealers throughout the country. Single copies

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.

the news agents.

Publishers' Notice to Mail Subscribers.

Mail subscribers will observe on the printed address of each paper the time for which they have prepaid. Before the time indicated expires, to insure a continuity of numbers, subscribers should remit for another year. For the convenience of the mail clerks, they will please also state when their subscriptions expire.

New subscriptions will be entered from the time the order is received; but the back numbers of either the SCIENTIFIC AMERICAN or the SCIEN-TIFIC AMERICAN SUPPLEMENT will be sent from January when desired. In this case, the subscription will date from the commencement of the volume, and the latter will be complete for preservation or binding.

VOL. XXXVII., No. 13. [NEW SERIES.] Thirty-second Year.

NEW YORK, SATURDAY, SEPTEMBER 29, 1877.

Contents, (Illustrated articles are marked with an asterisk.)

193 197 193

199 201

203

American Association of Science	193	Marble, to stain (66)
Antimony, butter of (62)		Mars, moons of
Axle lubricant (56)	204	Medicines, patent, etc
Axle lubricant (56) Beesw ^o x, to refine (32)	203	Meteors, stationary
Beetle 'Colorado, in Europe	198	Neptunium and Davyum
Beton, manufacture of	201	New publications
Birds, when wake up		Nuts, rusty, to start (43)
Birds of Paradise*	199	Oxalic acid, preparation of
Blackboards (40)	203	Parchment paper, to make (10).
Boiler, vertical*	194	Parrots, culture of
Brass, to polish	197	Patents, American and foreign.
Bronze statuary, to repair (72)	204	Patents, official list of
Cannon, breastwork*	200	Polish for turned work (23)
Car couplers, self-acting	191	Postal convenience, needed
Carbon plates for battery (2)	203	Rattlesnake, a horned
Car coupling*	198	Recoil, bodily
Car coupling* Calorimeter (44)	204	Rifle barrel, to straighten (34)
Celluloid to make (78)	201	Rifle contest, international
Celluloid, to make (73) Cement for harness (65)	204	Sash balance*.
Cement for aquarium (17)	208	Sahara, the sea in
Cement for knife handles	194	Science, British Association, 197,
Clock, mysterious*		Sheepskin, finish for (61)
Coupling halter etc*	108	Solder, Britannia (5)
Coupling, halter, etc.* Decay, preventing in wood (8)	208	Steamer, new iron
Disgust	192	Steel pens, old to make new
Drum heads, to make (70)	201	Stove, a chimneyless*
Electric light, application of '	195	Sumac, to prepare (67)
Electric light, concerning (9)	203	Sun spots and famine
Engine vertical compound*	191	Surf car American*
Engine, vertical compound* Errors, typographical	196	Surf car, American*. Telescope, to focus (30)
Germ destruction	200	Tellurium
Glass, to make fusible (69)		Temperature at boiling point
Gun barrel, to bronze (36)	203	Tin, to print on (68)
Heat, meteoric		Tree that rains
Inventions patented in England.	201	Tube white, how made (1)
Joint, to cast (52)	204 .	Vinegar, vitriol
Keely motor, the*	196	Waterproofing for blanket (1)
Launch, small steam	196	Wax for modeling (13)
Latitude, rule for finding (46)	204	Wax for modeling (13) Wine, influence of bottles on
Light, influence of, on metals	193	Wool, coloring
Manganese minesin Italy	197	Wool, coloring. Worms, agricultural value of

TABLE OF CONTENTS OF THE SCIENTIFIC AMERICAN SUPPLEMENT,

No. 91,

For the Week ending September 29, 1877.

For the Week ending September 29, 1877.
I. ENGINEERING AND MECHANICS.-Valves for Gas and other purposes. 5 figures.-On the Artificial Production of Ice. 3 engravings.-Equili-brium Blow-of Cock. 1 engraving.-The Rouchat Viaquet on the Paris and Orleans Railway. 12 illustrations. Street Track Sweeper.
II. LESSONS IN MECHANICAL DRAWING. By Professor C. W. MAC-CORD.-The Screw Propeller (continued). 9 illustrations.
III. TECHNOLOGY.-New Mordant for fixing Coloring Matters.-Wash-ing and Cleansing Wool.-Remarks on Aniline Black.-Aniline Black of Callico.-Chlorite of Ammonia.-Sulphide of Copper Parts. Muritate of Callico.-Chlorite of Ammonia.-Sulphide of Copper Parts.-Muritate of Silk in an Alkaline Glycerii Solution of Copper.-Sulphole's Addis.-Application of Electricity in Dyelog. Application of Alumen.-Mor-dant for Turkey Red.-Fast Proce from Artificial Cochineal.-Alum Treatment of Silk.-Application Chrome in Printing.-On Dyeing in Wooden Beeks.-Bleaching China Clays. 1 engraving.-Wrought Tron Balconies from Venice and Milan. 2 engravings.-Substitute for Oil.-Preservation of Iron Structures.-Prices now and in 1860.
IV. ARCHITEC/URE AND BULLDING.-Cheap Freproof Houses, De-

ARCHITECTURE AND BUILDING.—Cheap Fires now and in 1800. ARCHITECTURE AND BUILDING.—Cheap Fireproof Houses. De-scription of Model Fireproof Houses erected for Mr. Sydney Myers, Chicago. Embracing prize plans of twelve hundred and seventeen hundred dollar fireproof dwellings. With 9 engravings.

Scientific American.

DISGUST.

A remarkable and ingenious analysis of the sensation of disgust and the causes to which it is owing, has recently appeared in the Revue des Deux Mondes, over the signature of M. Charles Richet. We regret that our limited space precludes notice of the wealth of illustrative instances which the author brings forward to negative the old saying, and to reach a re- sion is agreeable. sult which shows that, if "there is no accounting for taste," there is at least a very plausible accounting for *distaste*. The reasoning, however, of which we have prepared the following summary, is well worth consideration:

There exists in nature, for man as well as for all other judges simply by form and appearance. living beings, certain substances which are alimentary and others which are not. There exists also a special sense which warns us of the nutritive value of different substances. This gratisfor every club of five subscribers at \$3.20 each; additional copies at sense depends upon the sense of taste. Milk, sugar, and meat are aliments, and taste testifies to the fact, inasmuch surfaces retards the boiling. For instance, in a metallic vesas it is agreeably excited by all three. Nor could the con-sel water boils with perfect regularity, and at a temperature trary be true. Nature could not have inspired us with re-properly corresponding to the pressure to which it is expugnance for that which should and does constitute our posed; the vapor bubbles which develop on all points of the nourishment. Moreover, and besides the sense of taste, by walls of the vessel are very small and follow one another a very simple association of ideas, the senses of smell and with perfect regularity. In vessels of glass and porcelain, sight are affected so that these aliments gratify us both by to the contrary, the vapor bubbles develop only at few their odor and aspect.

> taken in its restricted meaning, it is simply the perception metallic vessels under otherwise the same circumstances. tactile disgust, all of which produce similar effects.

It is certain that the exterior objects themselves are not ing the liquid. inherently disgusting; but are so only in their relation to while the same are a source of pleasure to others. The odor bursts in fragments. of decomposition is insufferably disagreeable to human be- Dufour found that a liquid may be heated far above its with our organization.

have given to our ancestors an accumulation of instinctive great violence, almost explosive. sentiments, each appropriated to the protection of certain. That this property is not confined to water but to other by the disgust produced, warn us of their perils. But instinct it to flash into vapor. is, nevertheless, blind. Quinine, for example, which it recognizes as bitter and distasteful, is often salutary and beneficial.

point of view, as, for example, its habits, its physiological nature, its use to the farmer, etc., then the sentiment of disgust vanishes. Similarly, in works of art, where the dominant idea may be one which naturally would cause disgust, yet the idea may be so combined with others that the feeling is not experienced, but, on the contrary, the general impres-

To sum up, disgust is an instinctive sentiment of self-protection, variable with the species, and according to the alimentation, habits and education of individuals. It is the consequence of heredity, but it is an imperfect instinct, since it

ANOMALIES IN THE TEMPERATURE OF THE BOILING POINT.

It has been observed that the mere contact with certain points, which are always the same. The bubbles are large, Co-ordinate with taste exists a totally opposite sense, and do not follow one another with rapidity. The tempera-F Subscriptions received and single copies of either paper sold by all namely, disgust. This is a sort of pain which, if it ture of water boiling in glass vessels is also higher, often as is too prolonged or too intense, leads to nausea. But if much as 2° Fah., than the temperature of water boiling in

> of a disagreeable odor or flavor. Thus bitter and fetid The boiling of sulphuric acid takes place in glass vessels substances produce disgust. If by an effort of the will we only with intermittent impulses. The temperature rises eat such bodies, then nausea supervenes. Similarly sight above the regular boiling point, until at the bottom of the and feeling may also produce in us disagreeable sensations vessel a large vapor bubble is formed, the appearance of comparable to the foregoing, so that there may be recognized, which is always accompanied by a lowering of the temperafirst, gustative and olfactory disgust, and second, visual and ture. Such irregularities in the boiling are easily avoided by throwing platinum wire on the bottom of the vessel contain-

> Water deprived of air, and enclosed in a glass tube from ourselves. For if our organs were otherwise constituted, we which the air has been exhausted, boils only at a very high should experience other sensations. Fetidity, bitterness, or temperature. A water hammer, which is arranged as deugliness are not essential qualities of objects. Such attri- scribed, may sometimes be heated to 275° or 300° Fah. withbutes are a portion of our own perception. This is evident, but the water boiling; when, however, the boiling comfrom the fact that certain objects disgust some animals, mences it is so sudden and explosive that the glass tube

> ings, yet it is delightful to flies, vultures, and carrion crows. normal boiling point without actually boiling when it is sur-Objects disgusting to one person are not necessarily so to rounded with another liquid of higher boiling point, in which another. Laplace ate spiders and enjoyed them. A king of it will not dissolve. If water is gradually poured, drop by France sickened at the odor of strawberries. Digger Indians drop, on linseed oil heated to 220° to 230° Fah., the drops eat grasshoppers. A recent Chinese traveler gives an instance fall slowly through the oil without showing the formation of of where the inhabitants, while devouring a meal of decayed any vapor, while this only takes place when they come in fish, turned in violent disgust from roast duck. The toad is contact with the bottom of the vessel, when they boil away to many people repulsive. Yet it is not essentially hideous. violently, and steam passes rapidly upward through the oil. "The female toad to the male toall," says Voltaire, "is an By mixing some fatty oil with a liquid may be obtained, ideal of beauty." Nothing is ugly or fetid in nature; but which, when hot, has the same specific gravity as water, and things seem so only because they are in a certain relation in which globules of water, of various diameters varying from $\frac{1}{20}$ to $\frac{1}{3}$ of an inch, will remain suspended without ris-Despite the mass of contradictory facts which envelope it, ing or falling. By careful heating the temperature can be there appears to be an underlying law which connects this raised to 250° and even to 340° before the water commences instinct of disgust to the instinct of self-preservation. How to boil. When, however, a drop of water so heated comes the first is to be acquired is to be explained only as a fact of in contact with the side of the vessel, or with a solid body, heredity. The struggle for existence and natural selection such as a wooden or glass rod, it boils at once away with

> organs. Bitterness no more exists in strychnine than does liquids has been proved by various trials. So, for instance, pain in a knife or redhot iron. Yet strychnine seems to be when chloroform, which, when heated by itself, boils at 142°, bitter and the knife cut painful; and in these sensations, is poured in a solution of chloride of zinc, brought to the nature provides us with a safeguard against the dangers of same specific gravity by proper dilution, the chloroform both. Similarly, reptiles dangerous to man inspire us with globules will remain suspended and the solution of chloride an extreme repulsion. Foul gases and purulent liquids, by of zinc may be heated to 200° or 212°, before the chloroform affecting the three senses of taste, smell, and feeling, likewise will boil; but also here the contact of any solid body will cause

> All these phenomena are explained by the fact that liquids adhere very strongly to certain solids, and more to glass than to metal. But that liquids adhere still more to other liquids, As a consequence of this hereditary acquisition of instinct, even when they do not intermingle (such as water to oil or it follows that the substances not met with in nature cannot chloroform), is proved by the last mentioned interesting exhave any action on our senses if their constitution is totally periments of Dufour, in which the water globules suspended different from those with which we or our ancestors are or in a mixture of two oils of the same specific gravity, also have been familiar. Suppose, for example, that a plant demonstrate the mutual adhesion of the water particles, in should be discovered containing a dangerous but hitherto un- the same way that in the experiment of Plateau the suspension known alkaloid. As this might have some properties of, of oil globules in a mixture of water and alcohol, of the same and hence the taste of, other alkaloids, such as quinine or specific gravity, demonstrates the mutual adhesion of the oil

hundred dollar fireproof dwellings. With 9 engravings. V. NATURAL HISTORY, GEOLOGY, ETC. --The Fall of a Mountain in Savoy. --The Credit Side of the Insect Account. --Red Water in Long Island Cound. --Octopus Fishing in Japan. - Ancient Life in America. By Profession. -Octopus Fishing in Japan. - Ancient Life in America. Origin of Hoofed Animals. The History of Me Swine, Camels. Deer, and Effe-ption. - The Instance Man. Relation of Successive Groups. Savoy -- The Credit Side of the Insect Account. -- Red Water In Long Island Sound -- Octopus Fishing in Janan -- Ancient Life in America. By Professor O. C. Marsh. Sloths that went to South America. Origin of Hoofed Animals. The History of the Swine, Camels, Deer, and Ele-phants. The Primates, including Man. Relation of Successive Groups. Remains of Man on this Continent. YI. AGRICULTURE, HORTICULTURE, ETC. -- Pot-grown Strawberries. By F. R. PIERSON. -- Reclaimed Salt Marshes. By W. CLIFT. -- Drain-age, top dressing, etc. -- The Caterpillar Cure. -- Growing Chestnuts from Seed.

- RONOMY.—Opposition of Mars.—A Curious Globe.—A Meteor-N feet in Diameter. The Stalldalen Meteorite. Abstract of an ss by Professor Nordenskjold before the Royal Swedish Academy ences.—A visit to Lord Rosse's Telescope. VII. ASTR ite 1,500 f Sciences
- of Sciences.—A visit to Lord Rosse's resecope. II. CHESS RECORD.—William Steinitz. Introduction, Portrait, and Problem.—The Vienna Chess Congress of 1873.—Problems, Nos. 15 and 16, by S. LOYD.—Two Games between STEINITZ, BLACKBURNE and ZUCKERFORT.—Solutions to Problems.—Amateur World Problem Prize.—Scientific Queen Problems. VIII.

Terms.-SCIENTIFIC AMERICAN SUPPLEMENT, one year, postpaid, five dolars. One copy of SCIENTIFIC AMERICAN and one copy of SCIENTIFIC AMERICAN SUPPLEMENT, one year, postpaid, seven dolars. CLUBS.-One extra copy of the SUPPLEMENT will be supplied gratis for every club of five SUPPLEMENT subscribers at \$5.00 each.

NVE SUPPLEMENT Subscribers at \$5.00 each." All the back numbers of the SUPPLEMENT, from the commencement, Jan-uary 1, 1876, can be had. Price 10 cents each. NOW READY.-The SCIENTIFIC AMERICAN SUPPLEMENT for 1876, Complete in two large volumes. Over \$80 quarto pages; over 2,000 engrav-ings. Embracing History of the Centennial Exhibition. New Illustrated Instructions in Mechanical Drawing. Many valuable papers, etc. Price five dollars for the two volumes, stitched in paper; or six dollars and fifty cents, handsomely be and in stiff covers.

Remit by postal order. Address MUNN & CO., PUBLISHERS, 37 Park Row, New York. 38 Single copies of any desired number of the SUPPLEMENT sent to one address on receipt of 10 cents.

strychnine, we should thus be warned; but if, on the con- particles. But the experiment of Dufour is the most remarktrary, it had all the chemical properties of sugar, then its able, demonstrating as it does how the effect of heat in sepsavor would be sweet, and we could not tell whether it was arating the liquid particles and changing them into vapor or was not a healthy and useful aliment. The same is true needs the contact of solid bodies to be effective, and may be of artificial bodies: the cyanides and prussic acid are found counteracted to a certain degree by withdrawing the liquid but in very minute quantities in nature, yet their taste is not from the contact of any solid body, by supporting it floating disagreeable. 'Carbonic oxide, a most dangerous gas, is with in another liquid.

out odor, and is unrecognizable to the senses. It is not a natural product, inasmuch as it is due to incomplete com-

bustion; hence, as it must be artificially made, the ancestors of our race never encountered it.

termed that of inutility, as being at the foundation of disgust. Everything useless is revolting. The products of secretion, agreeable both in taste and odor.

Disgust, lastly, may be produced by mere recollection a toad, we think of a toad and the idea may be disgusting; but if, while speaking, we consider the toad from a special before the Royal Society, after a careful examination of the

SUN SPOTS AND FAMINE.

It has been surmised that some relation exists between sun spots and prevalent weather on the earth, and the theory

Besides this law of nocuity, there is another which may be has been proposed that periodic variations in climate bear some relation in recurrence to the cyclical periods when the sun spots are most or least numerous. Dr. Hunter, Official for example, are repulsive to sight and smell, when the or. Director General of Statistics, has recently directed the atganism rejects them as useless. Milk, on the other hand, is tention of the government of India to this alleged connection between the periods of maxima and minima sun spots and the amount of rainfall at corresponding times in the without any actual sensual impression. When we speak of Madras Presidency, where a great famine is now impending. General Strachey, however, in a recent communication read