SCIENTIFIC AND PRACTICAL INFORMATION.

NITROGEN GAS.

This neutral, lazy gas is little used, excepting where an experiment requires to be performed in an atmosphere free from oxygen, as in making amorphous or red phosphorus; and even here carbonic acid gas will work as well and is more easily prepared. For lecture room experiments, to show the properties of nitrogen, it is generally obtained from the air by burning phosphorus under a bell jar of air. A neater method, and one that furnishes it in a steady current, is by heating nitrite of potassium. Take a strong solution of caustic potassa, and pass into it a current of nitrous acid, generated from starch and nitric acid. When the solution has become strongly acid, stop the current of nitrous gas and neutralize the solution with potassa. This solution of nitrite of potassium will keep well until needed. When about to generate the nitrogen gas, place one volume of this solution in a retort fitted with a tubulated receiver and a delivery tube leading into the pneumatic trough. Also place in the receiver three volumes of a saturated solution of chloride of ammonium. Heat gently to about 125° F. The decomposition is as follows: $KNO_2 + NH_4Cl = KCl + 2H_2O + 2N$. The chloride of potassium remains in the retort, the water is caught in the receiver, and the nitrogen is given off from the delivery tube.

SOME EXPERIMENTS WITH PERMANGANATE OF POTASH.

When a hot concentrated solution of permanganate of potash is dropped carefully into a test tube containing a small quantity of glycerin, a very violent chemical action takes place; a portion of the glycerin is carbonized and thrown out of the test tube. Oxalic and formic acids are also produced. With ordinary alcohol, permanganate of potash produces a violent reaction, as has been frequently explained in scientific journals.

Oil of aniline is violently decomposed by a hot solution of permanganate of potash, but the resulting vile-smelling compounds have not yet been studied.

SEPARATING WOOL FROM COTTON IN MIXED FABRICS.

Two cases may naturally arise: First, where the rags used are in great part cotton, and it is desired to destroy the woolen fibers in order to use the cotton for paper stock. Second, where the wool predominates, so that it is more profitable to destroy the vegetable fiber and preserve the wool.

1. The wool remaining after the mechanical separation of the rags is mostly destroyed by the alkali wherein the cotton is boiled before bleaching it. If it were attempted to dissolve out all the wool with alkali, it would be too expensive and would not pay. In this case what is known as Ward's method is employed. The rags are subjected to the action of superheated steam under a pressure of 3 to 5 atmospheres. At this temperature, the wool is converted into a black friable substance, which is easily separated by mechanical means as a dry powder. This powder is an excellent fertilizer, containing 73 per cent organic matter, and from 10 to 12 per cent nitrogen.

To destroy the vegetable fiber and preserve the wool, several methods may be used. The rags may be soaked with water containing 5 to 10 per cent sulphuric or hydrochloric acid, slightly pressed out, and then dried on the floor of a room heated to 190° or 212° F. for some hours. As the water evaporates, the acid becomes more concentrated and converts the cellulose into sugar and a gummy substance. Kopp considers the following the most rational and cheapest method: The rags are put in a bath of 100 parts acid and from 300 to 500 parts water, then taken out and allowed to drain, and are slightly pressed out, then dried slowly in a room in a current of air at a temperature of from 160 to 195° F. for many hours. When the wool is of very good quality, instead of using sulphuric or hydrochloric acid, oxalic acid or chloride of aluminum is used. These substances destroy vegetable fibers without perceptibly attacking the wool.

CHLORALUM.

Upon examining various disinfecting preparations of the Chloralum Company, in London, Professor Fleck, of Dresden, found that it compares with the following ordinarily used and less expensive deodorizers and disinfectants:

	Parts putrefying matter.
Bleaching powder or chloride of lime disinfects......	100·00
Burnt lime "	84·6
Alum "	80·4
Sulphate of iron "	76·7
Chloralum "	74·0
Chloride of magnesium "	57·1

The chloralum is prepared by treating ferruginous clay with crude muriatic acid, and decanting the liquor, which constitutes the disinfectant. The residue is sold as "Chloralum Powder." The author discovered in the latter 0·72 per cent chloride of arsenic, 0·55 chloride of lead, 0·37 chloride of copper; but the preparation in the liquid form yielded less lead and copper. The author warns the public against the use of these antiseptics, or whatever they may be called, for ulcers or for use as a gargle in diphtheria or sore throat, for which purposes they have been recommended. The translator would remark that the so called "Bromo-Chloralum" of American manufacturers is a different and perfectly non-poisonous preparation, it being a concentrated solution of aluminum chloride and bromide, while the English chloralum consists principally of chloride of aluminum.

ARTIFICIAL SKINS FOR SAUSAGES.

In Würtemburg there has been started a new industry, which consists in the manufacture of skins of parchment paper for sausages. This artificial product is considerably cheaper than the natural one; it is not subject to fermentation, and is distinguished by its cleanliness. It is made by means of machines, in the thickness of ordinary writing paper, and samples may be obtained by writing to Carl Brandegger, at Ellwangen, and enclosing the amount of the postage.

BOAT LOWERING APPARATUS.

A correspondent, R. B. F., of Mass., says: "In your No. 20, page 315, there is a description of a boat lowering apparatus, by E. J. Hill, Pimlico, England, whereby the ends of a boat are held by tackles and "slip hooks;" so that, on touching the water, the boat is released at once. If the water be smooth, this is all very well; but if it be rough, there will be great danger of the forward end being released first. I have seen this slip hook or one like it at the Navy Yard here."

List of Naval Subjects.

The council of the Institution of Naval Architects, London, have prepared the following list of subjects, which they desire to submit to the members and associates of the Institution, and others interested in shipbuilding, as questions on which they will be glad to receive communications for the annual general meeting in April (2d to 5th), 1873. It is requested that all such communications may be forwarded to the secretary of the Institution not later than 28th February, 1873:

1. The construction of vessels for coast defence.
2. The effect on naval construction of torpedoes, or other modes of submarine attack.
3. On the results of the best modern practice in ocean steam navigation, with reference to the latest modern improvements—such as surface condensation, superheating, compound engines, and the like; also the value of each of these taken separately, and especially the results of any actual experiments to test this point.
4. On the friction developed in marine steam engines of different forms; and on the difference between the gross indicated horse power developed in the cylinder and the net effective horse power available for the propulsion of the ship after working the air pump, slide valves, and other moving parts of the engine.
5. On economy of fuel in marine engines, with detailed results.
6. On marine boilers, their rate of combustion, and the proportioning of their various parts.
7. Information as to the deterioration of marine boilers supplied with water from surface condensers and the remedies for this.
8. Description of any improvements in the details of construction of marine engines.
9. On methods for starting, stopping, and reversing marine steam engines of high power.
10. Details of any experiments tending to throw light upon the theory of the steam engine.
11. On the life and cost of maintenance of merchant steam ships.
12. The design and construction of yachts.
13. On legislative interference with the construction, stowage, and equipment of ships.
14. The effect on shipbuilding of Lloyd's rules, the Liverpool rules, and the rules of other similar societies for the classification of ships; and on ships not classed.
15. On methods for the proper strengthening of ships of extreme proportions, and on the precautions necessary to insure their safety at sea.
16. On the straining effects of engines of high power on the structures of ships, and the arrangements necessary to obviate them.
17. On the present state of knowledge on the strength of materials as applied to shipbuilding, with especial reference to the use of steel.
18. Description of any vessel actually built, or in course of building, exhibiting great novelty in its principles of construction.
19. The preservation of a ship's internal structure from the effects of bilge water, leakage from cargoes, etc.
20. On the masting and rigging of ships, and on iron and steel masts and yards.
21. On ships' boats, and on apparatus for lowering and disengaging them.
22. On machines for economizing labor in the construction of ships.
23. On the use of machinery for economizing labor on board ship, whether merchant ships or ships of war, and whether for loading or manœuvring.
24. On the best method of clearing vessels of water in the event of a leak, and on any novel form of ship's pump.
25. On the means of accurately measuring the speed of ships.
26. On instruments for measuring and recording the rolling of ships, both as to time and extent of roll.
27. Actual measurements or records of sea waves; their hight, length, periodic time, and speed of advance; or their profiles.
28. On the measure and amount of resistance opposed to a ship's progress by the water through which it moves.
29. Exact information (either experimental or theoretical) on the efficiency of propellers.
30. On the ventilation of ships by natural and forced drafts, with details of any system in actual operation.
31. On the economic value of form and proportion both in merchant vessels and in ships of war.
32. On floating structures for special purposes—such as docks, lighters, tank vessels, light ships, telegraph ships, and others.

THE cotton crop of the United States for the present year has been favorable. The total product for the year is 3,500,000 bales of 465 lbs. each

Value of Scientific Study.

Professor Jenkin, of Edinburgh University, on recently assuming the duties of the Chair of Engineering, founded by the late Sir David Baxter, made an admirable address to his class on the above subject, from which we take the following:

The originality which suggests novel enterprises—the common sense which judges the soundness of an undertaking—the experience which specifies the quality of every material required, and the manner in which old well known details are to be carried out—the business habits and sagacity which guide men in the superintendence of work and workmen—the clear head which understands obligations imposed by a contract, and which can write a document having a definite meaning—still more the glorious faculty of invention, by which a man creates, as it were, a new thing, and gives new power into the hands of his fellows—these qualities or faculties are all useful to the engineer in the highest degree, and neither I nor my colleagues can give them. The old self-made, unscientific engineers possessed them, and in virtue of them became what they were and are. Unscientific untaught men, who have these qualities, will still become engineers in spite of scientific rivals. All this I willingly concede; yet I claim that scientific teaching will help most those men who would do most without it, and that it will render useful even an inferior class of men, who without it would be helpless and useless. Originality is not damped but guided by science; common sense suffers no wrong at the hand of knowledge; experience is not weakened by the power of calculation; education does not debar men from a knowledge of the world; the clearest head is strengthened by scholastic training; and the inventor is guarded from countless disappointments by obtaining the power of calculating results without, in every case, testing his suggestions by actual and costly experiment. In a word, scientific knowledge makes the great man greater, adding to his powers, and it guards the weaker brethren from many follies.

Discovery of New Fossils.

Professor O. C. Marsh records the discovery of remains in the eocene of Wyoming which clearly indicate several representatives of the lower *quadrumana*. Although these fossils differ widely from all known forms of the above group, their more important characters show that they should be placed with them. The genera *Lemnotherium Thinolestes* and *Telmatolestes* especially have the principal parts of the skeleton much as in some of the lemurs, the correspondence in many of the large bones being very close. The anterior part of the lower jaws is similar to that of the marmosets, but the angle is more produced downward and much inflected. Some of the species apparently have forty teeth.

The large carnivore, recently discovered by Professor Marsh, is of a genus quite distinct from *L. ferox*. The canines and premolars of the lower jaw somewhat resemble those in the hyena, but there are only two incisors in each ramus. The remains indicate an animal about as large as a lion. The genus they represent may be called *Oreocyon*, and the type species, *Oreocyon latidens*. An interesting addition to the reptilian fauna of the cretaceous shale of Kansas is a very small saurian, which differs widely from any hitherto discovered. The only remains at present known are two lower jaws, nearly perfect, and with many of the teeth in good preservation. The jaws resemble in general form those of the mosasauroid reptiles, but, aside from their diminutive size, present several features which no other species of the group has been observed to possess. The specimen clearly indicates a new genus which may be called *Colonosaurus*, and the species may be named *Colonosaurus Mudgei*, after the discoverer, Professor B. F. Mudge.

Few Guns and Poor Powder.

Would it not be more advisable for Congress, instead of appropriating half a million dollars to pay for the pleasure trips of a commissioner and a score of assistants to the Vienna Exposition, or to assist a body of manufacturers who need no such aid to forward their goods to European countries, to devote such money to protecting our harbors so that the iron clad vessels of foreign nations would be prevented from steaming up to our very wharves? The ordnance officers of the army state that our sea coast fortifications are armed with but 317 fifteen inch guns, all told; that the powder in the magazines was all made during the war and is of small grain, besides being damaged by age for use in these great guns, and that there are only on hand eighty projectiles for every fifteen inch gun, of which number only ten are solid shot.

Practical School for Weaving.

The organ of the German wool industry publishes the programme of the above school, situated in Grünberg, Silesia. In this institute the following branches are taught: Shaft (or treadle) weaving, and weaving with the Jacquard loom in all its details, the weaving of woolen shawls, the weaving of velvet, plush, and carpets, the preparation of mordants and dyes, and chemistry as applied to dyeing. The pupils are practically instructed in executing patterns in colors, in designing, warping, in operating with the reading and stamping machine, and in weaving after known and self-invented patterns. They are made acquainted with the drawing and designing of the patterns in simple and compound forms, with the construction of the different machines, and other branches too numerous to be mentioned here.

A PATENT, granted not long ago to a Mr. Keep for a stove, contains no less than sixty-two different claims for improved parts. Some of them are exceedingly small points.