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THE SCIENTIFIC AMERICAN SUPPLEMENT.
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MODERN ROWING RACES.

Our aquatic sports seem to be assuming an artificial nature which is rendering them more and more unlike those of an earlier and less "advanced" period. Rowing races certainly have become reduced to competitions in which the conditions imposed by Nature, which give zest to the exercise and, through their very variety, constantly call forth fresh skill, are carefully eliminated. There is no sport more exhilarating, more healthful, or more reliable in results than this, when genuinely followed; but as it is now practised it is scarcely possible to place it on a level with the sports of the turf. It is an undeniable fact that horse racing has resulted in vast improvements in the breed of horses, and thus a genuine good is gained, which at least neutralizes the evils attending the practice. But we doubt if any corresponding advantage can be shown in favor of modern struggles at the oar.

We have learned to build boats so light and fragile that almost the rope dancer's skill is required to maintain one's equilibrium in them. They are utterly useless save in water as smooth as glass. The oarsmen are educated to so fine a pitch of physical culture that exhausted Nature too often passes the dividing line, and the superb athlete breaks down and becomes a life-long invalid. In fine, boat, water, oars, training, conditions of wind and weather, everything attending the sport, are all subservient to the single aim of disposing men so that by muscular work they can accomplish a certain distance in a certain time. So far as boat and water play any part, a result equally useful would be reached did the crews, instead of risking their lives under a torrid sun, seat themselves comfortably in a gymnasium and pull in concert against machines which would register the mechanical effect of their efforts in foot pounds, the crew with the largest registered number to be declared the winners.

The reports of the recent regatta at Saratoga tell us that the Cornell men won by sheer force of strength. They showed no technical excellence in their rowing; their appearance was not especially graceful; they lacked what is technically called form; but they lifted their boat, as it were, by main strength, and pushed it forward with the power and endurance of giants.

We do not think that such work is entitled to the name of skillful boating; and certainly, in point of heroism, it must be considered inferior to that ability which guides the lifeboat through the surf to the wreck, or pulls against varying tides and currents, or urges the sharp bowed whale boat in pursuit of the sea monster, or even handles the oar in a high running sea. To our minds, races occurring, not in hot July but in cool October, and not in mere shells on a placid lake, but in staunch cutters in a sea and tide way, would be infinitely more beneficial to the participants, and at the same time would call for the display of higher qualities, both of physical strength and calm judgment.

OUR YACHTS AND YACHTING.

There are abundant criticisms which may justly be urged against our present so-called yachting. Our yacht fleets are supposed to be a nursery of marine architecture, a constant field for experimentation in the construction of sailing craft of the finest possible form. The building of yachts is presumed to have higher aims than the mere furnishing of pleasure boats. We have, it is true, produced many beautiful models, famous the world over, but some of the best judges of naval architecture assert that we have never surpassed the celebrated America, built by Steers nearly a quarter of a century ago. That vessel has recently been in dry dock refitting, and certainly it is difficult to imagine more exquisite lines than her under-water body presents. We cannot therefore claim any material advance in the hull architecture; nor can we assert that we have built vessels with improved seagoing qualities. The America crossed the ocean years ago to sail for the Queen's cup. A few yachts have done so since, but the pleasure vessels rarely go to sea during a stormy season of the year. Yet pilot boats even smaller in size constantly cruise hundreds of miles from land in midwinter, and in the fiercest gales; and Long Island and New England fishermen unhesitatingly put to sea in storms which would send every yacht close-reefed into the nearest harbor. Nor has our yacht squadron shown itself of value as a school for seamen. The wretched incompetence exhibited in the circumstances attending the disastrous capsizing of the Mohawk, the largest sailing yacht in the country, in New York harbor a few days ago, is too fresh in the public mind to need any commenting upon in this regard.

So far as competition goes, the yacht race has become a matter of speed, no matter how gained. We have seen repeated instances of vessels fitted with sails so largely out of proportion to the hulls that a moderate breeze would be very liable to throw the latter on their beam ends. But to counteract the enormous heeling tendency, racing crews of unusual numbers are brought on board, and each man is provided with a sand bag. He is simply living ballast, and his duty is to transport himself and sandbag as far to windward as he can get. The pressure on the sails is met, not by build, nor by displacement, by breadth of shoulder, but by weight of men and sand bags. Not long ago a catamaran (two parallel hulls covered by a transverse staging and rigged with mast and sails) fairly vanquished a number of crack yachts. The yacht owners loudly protested against being conquered by so outlandish a craft, forgetting the fact that the ingenious builder merely gained stability by a device substantially the same and very much more effective, though of course more obvious, than theirs. Certainly the means he adopted were not a whit more artificial.

The Rev. Dr. Hepworth, of this city, an enthusiastic yachtsman, has, since the above was written, published a work in which our yachting is mercilessly criticized. He says of the yachts: "They have generally very graceful lines, great breadth of beam, which makes them roomy and comfortable under deck, but are often so overloaded with spars and canvas that they are unfit for rough outside work. Our topmasts run upto such an incrediblehight that, when the boat begins to roll in a seaway, it seems as though she would never stop until she had jerked out her spars.

"The crowning defect, and one which we are beginning to acknowledge, is the shape of the bows. They are so sharp that they not only cut through the water when it is smooth, but they also cut into it and under it when there is any seaway on. The only thing that holds the head of a yacht up in rough weather is its preposterous bowsprit and jib-boom. We crawl along inshore and run for a harbor when the wind blows a reefing breeze. The play of a coaster or lumberman is the agony of a yacht."

In this country, where a large standing navy no less than an army is deemed unnecessary, it follows that not only the military but the marine service must in time of need be derived from the people. Our geographical position moreover renders it likely that a war between ourselves and a foreign power would mainly be waged afloat. An advantage to the community therefore primarily exists in fostering aquatic skill, while there are other advantages, sufficiently indicated above, which also might be secured. In this view the present condition of our aquatic sports is plainly one which might greatly be modified to the general benefit.

THE VENTILATION OF RAILWAY CARS.

Scarcely less important than the long-vexed and almost hopelessly unsolved problem of securing good air in public assembly rooms is the proper ventilation of public conveyances. Under no other conditions are we packed so numerously in limited spaces; and as a rule our journeys are of longer duration than the times we spend in places of public amusement, instruction, or worship.

The problem, so far as it relates to railway cars, was discussed at considerable length at the recent convention of the Master Car Builder's Association. Neither the committee's report nor the subsequent remarks of the members of the association give much cause, however, for expecting any immediate relief from the poisonous atmosphere the traveling public has to put up with as a rule. The important fact that pure air is desirable in public conveyances is recognized in a languid sort of way; but, so the committee say: "The subject (of securing it) is still practically encumbered with difficulties, and our only hope is that, by treating it piecemeal, the difficulties may one by one be overcome." The past year has been "quite barren" of improvement in ventilating devices, still an increasing interest in the matter among car builders shows that "some progress is being made in the right direction."

But two or three recent devices were noticed by the association, and of these nothing positive was determined. Mr. Daniel S. Darling, of Brooklyn, submitted the model of a ventilated car, by which he claimed to meet all the requirements of the case. By this plan the fresh air is taken in through an opening at the crown in the ends of the car, immediately under the roof, the opening to be regulated according to the speed of the train and the quantity of air desired. The inflowing air is received in an air chamber and delivered through side openings a quarter of an inch wide, extending the whole length of the car. With an inlet 12 inches by 6, and a speed of 20 miles an hour, a steady supply of 800 cubic feet of fresh air a minute is promised, or enough to effect an entire change of air in the car every three minutes. No attempt appears to be made in this plan to prevent the entrance of smoke and dust; while the current, entering the body of the car in sheets, would seem to be specially favorable to drafts, though the inventor is of opinion that in a car ventilated in this way the fresh air will be diffused very gently.

Mr. H. A. Gouge, of New York, also presented a model illustrating some improvements on his mode of car ventilation. This plan has been tried the past year in a car running on the Boston and Albany road, giving, it was reported, very good satisfaction in warm weather. In cold wethera the warming of the car was defective, especially on an accommodation train; but that difficulty Mr. Gouge was confident he could overcome. Another car on the same road was provided with a fan ventilator, with excellent results in warm weather and with a moderate rate of speed; but it was very difficult to heat the air sufficiently in cold weather, and the air was rather close when the car was not in motion.

Still another plan was tried on the same road, the management of which seems to be commendably in earnest in this matter: a plan devised by Mr. Gates, of Boston. It consists in lowering the head lining a few inches so as to make an air chamber between it and the roof, from which chamber the fresh air enters the body of the car through wire cloth or perforations extending the entire length of the car. The entrance and exit of the air is regulated by swing sashes at each end of the car. So far the plan seems to work well, but a longer trial must be made before a decided opinion can be expressed in regard to its merits. A similar device is on trial on the Pennsylvania Road.

Favorable report was also made of the Winchell ventilator, with which certain western roads have been experimenting. The Canada Southern has had it, without deflectors, on four cars, and the representative of the road pronounced its operation very satisfactory. A little smoke got in, but not enough to be troublesome. The system consists

in an air chamber in the roof, extended into a hood covered with very fine wire gauze, and carrying in the end a wicket opened and closed by a rod. In the bottom of the chamber is a register through which the air is forced down the center aisle of the car. The rear gate acts as an exhaust. So far the plan resembles Mr Gates'. For summer use, when the windows have to be open, the rear gate is closed, and deflectors are used to prevent any inrush of smoke or dust at the windows, and to serve as an exhaust. The chief objection seems to be that it is costly, and the air is not warmed.

Evidently there is a good field here for our inventors to cultivate, one likely to be profitable to them and very beneficial to the traveling public.

TIMELY KEROSENE DANGERS.

While the mercury remains in the nineties and occasionally rises above 100°, it will be a prudential measure to keep a sharp watch on any kerosene oil that is being used. There are large numbers of rascally or ignorant dealers who sell a compound containing gasoline and other light products which will readily flash at 100° and often at 90°. As it is the gas or vapor from the oil that explodes, it is hardly necessary to point out the danger of keeping a material in the house which, during the intense heats of summer, will reach a state when such explosive gas is freely evolved.

Public attention may also here be called to the peril incurred in using kerosene on traveling conveyances. We notice that in several instances it is being used on railway cars in place of the safe candle; and on steamboats where coal gas is not employed, it is the only mode of illumination. It is curious to remark that for marine purposes the thoroughly reliable sperm oil is gradually becoming obsolete; and that even for vessels' side lights, where certainty of continuous illumination is the prime necessity, kerosene is being used. Sperm oil is actually difficult to obtain in this city, even in comparatively small quantities.

Of course, in the confined limits of vessels and railway cars, the perils from kerosene are greatly augmented; and where inspections by government officials, as in the case of steamboats, may carefully be made, we think that such should include a most rigid investigation into the kind and nature of oil employed. There are, of course, certain kinds of kerosene in the market practically as safe as sperm oil; but on the other hand, the poorer and more dangerous grades are cheaper, and hence are used both through ignorance and cupidity. The steamboat law is extremely explicit on the subject of explosive compounds, and it covers all cases, whether the material is barreled for freight, or innocently contained in the cabin chandelier. It distinctly states that "no products of petroleum shall be used on any steam vessel for illuminating purposes that will ignite at a lower temperature than 150° Fah." The penalty for carrying dangerous explosives is $5,000 fine, or three years' imprisonment, or both. The law is certainly stringent enough, and it remains for the authorities to enforce it, otherwise some frightful conflagration aboard a steamboat may be the result of their neglect.

We mention steamboats more especially because at this season of the year they are almost always crowded, and an accident, even through panic alone, may easily assume very serious proportions. Kerosene, we think, has no place on railway cars; it does not give an adequate light for reading at night, nor is it in any respect, save, perhaps, in point of expense, an advantage over the time-honored candle. In case of a collision or overturn of the cars, the breakage of the lamps and spilling of the oil have often produced a fire and a panic, and will so again if the companies persist in allowing its use.

THE THUNDERER BOILER EXPLOSION.

The double-turreted English ironclad Thunderer was recently the scene of a terrible boiler explosion. The vessel was built some three years ago but, had never been fitted for sea nor had her machinery tested. She had eight boilers of the common low pressure type, which supplied steam to twenty-six small engines for performing various work, besides to the main propelling engines, of 800 horse power. An official trial having been ordered, on the measured mile, near Spithead, steam was got up. The safety valves were supposed to be loaded to blow off at 30 lbs., and a large force of experienced firemen were employed under the Chief Inspector of Machinery. Fires had not long been started when a loud, sharp explosion, exactly resembling the report of a 38-tun gun, was heard, and vast clouds of steam poured up from below. The destruction was terrible. The men in proximity to the boiler were torn to pieces, while others, cooped up in the after-hole, were literally boiled to death. Fifteen persons, including the chief engineer, were killed instantly, and fifty-six were wounded. The end of the forward boiler on the starboard side was blown completely out, the uptake and main steam pipe were hurled bodily away, and the after fire room, generally, was a ruin.

It was supposed (and in the detailed accounts of the disaster which have reached us by mail, it is so stated) that a deterioration had taken place in the boilers, rendering them weak, owing to the lapse of time intervening between their reception from the contractors and the special trial. A telegraphic despatch, however, coming before the mail, reported the result of the official investigation, and the accident appears to have been due to the most inexcusable negligence. Previous to the steam trial, the boilers had been tested by hydraulic pressure, and, of course, all the safety and other relief valves were tightly fastened down by steel wedges. The wedges were forgotten. The pressure soon exceeded the strength of the plates, and the explosion was a necessary consequence. Those watching the steam gage must have seen its rapid ascent; and certainly it seems impossible that they could have failed to remark that the safety valve was not lifting after the 30 lbs. set pressure had been attained, and to have taken measures promptly to discover the cause; but the most cautious of men, on the other hand, cannot reasonably be expected to foresee and guard against the consequences of such inconceivable blundering as here appears to have been the case. This is the third serious disaster which has occurred to the English ironclads within a year, the previous casualties, the sinking of the Vanguard and the collision of the Iron Duke, being due to negligence but little less culpable.

THE CENTENNIAL EXPOSITION.

As the days have grown cooler, the attendance at the Centennial already shows gratifying signs of increase. Excursion parties, wisely postponed until the conclusion of the hot weather, are now arriving in rapid succession. Whole militia regiments from this city, college students by the hundred, miners of the Reading Coal and Iron Company by the thousand, bands of workmen from factories, besides the throngs of individual visitors, fill the buildings to an extent which is suggestive of the crowding which must take place when the September rush begins. The Granger excursions, and the farmers generally, are waiting to gather the harvests, and also for the great agricultural display of live stock, etc., to open later in the season. From present indications we think that those who contemplate a careful study of the Exposition will do well to make their visits now rather than risk later the annoyances which must follow the presence of a great crowd. If the interest which the people are taking in the show on one hand, and the comparatively small attendance during the past few weeks, are any criterions, the estimates made of the throngs which will pack the buildings in September and October are more likely to be exceeded than otherwise. Every department is now in perfect order, and the most elaborate of examinations can be comfortably and leisurely made.

Preparations for the live stock show, to be open from September 21 to October 4, are being rapidly advanced. A new entry is announced, which will be of the greatest interest to our stock raisers, in the shape of a drove of 100 of the choicest English cattle from the flocks and herds of Lords Chesham and Walsingham, the Royal Agricultural School, and others. The show of sporting dogs, to be held on September 4, 5, 6, 7, 8, also will be very attractive, a superb collection being expected from the celebrated English kennels. A large number of valuable prizes have been offered by private parties for the finest animals of various breeds. The American Forestry Association are to meet on the grounds early in September, and probably some useful suggestions will be forthcoming relative to the preservation and protection of forest trees.

THE ENGLISH COLONIES.

Four of the five Australian colonies, Victoria, New South Wales, South Australia, and Queensland, are represented at the Exposition. The fifth colony, West Australia, a penal settlement of scanty population, sends nothing. The vast gold production of Australia and New Zealand is represented by a tablet which faces the visitor at the entrance of the Victorian section. This gives statistical figures showing that, since 1851, the colonies have produced $1,220,823,034, a vast sum which affords an idea of the great *rôle* which the precious metal has played in the development of these young and vigorous provinces. An excellent feature of the Victorian exhibit is a collection of photographs grouped in frames of uniform size, illustrating the scenery, towns, and principal buildings in each of the shires into which the colony is divided. The most striking landscapes are presented in large oil paintings. Wheat, barley, oats, and wool, the last in fleeces of remarkable size, are the principal agricultural products exhibited. There are, besides, a fine collection of minerals, cases of stuffed birds and animals, shelves of ales and wine, cordage, stone ware, and food preparations of all kinds.

The adjoining section is that of South Australia, the agricultural resources of which are better than those of any other colony, although the mining interests are very small. The southern portion is claimed to be the finest wheat-growing country in the world. No less than 112 varieties of wine are shown. A series of photographs represents the rural life of the colonists, and the same graphic means is resorted to to show how a telegraph line was constructed across the island. The most curious exhibit in the section consists in the novel and beautiful objects made of the eggs of the emu. These are as large as ostrich eggs, and have a dark green surface resembling granulated morocco leather. They are superbly mounted in silver. One of the most elaborate pieces represents the egg (which opens and forms a casket) as a rock on a hill overshadowed by a peculiar indigenous tree. On the slopes of the hill groups of natives, in oxidized silver, are seen hunting emus and kangaroos. Another shows a group of gold miners at work, in the egg, and a lively encounter between natives armed with spears and clubs is going on outside in the midst of singular vegetable growths.

The New South Wales court is larger than that of either of the other colonies. A mineral trophy contributed by the Government Department of Mining is, after the great yellow column representing the gold production, the most prominent object. It consists of four large buttresses of coal from different mines, and of specimens of iron, lead, tin, copper, and auriferous ores. There is also a fine collection of tin ore specimens. Among the many photographs is one, a view of Sydney Harbor, which measures five feet by three feet four inches. This was printed from a negative of similar size, and one of the largest in the world. A pyramid of wine bottles, it is said, contains over 100 kinds of wine. There is a small collection of peculiar birds, among them being the "settler's clock" (*dacelo gigantica*) that salutes the rising sun with a sound resembling a laugh, and the Herodias crane that carries, attached to the middle of its back, a number of long skeleton feathers which it can erect at pleasure. Kangaroo leather, used for boot tops, is displayed in abundance, besides excellent exhibits of wool, woolen fabrics, and native woods.

Queensland divides her wall space into black panels, in which are descriptions and statistics of the different parts of the country. Near the appropriate tablets are landscapes, and also specimens of products of the various sections. A gold pyramid, and exhibits of wines, wools, oils, etc., fill the center of the court.

New Zealand exhibits bituminous coal from sixteen different seams, a pyramid of gold, a fine collection of ores and samples of crude petroleum too heavy for anything but lubricating purposes. A singular substance is the Kauri gum, a vegetable deposit found about six feet below the surface of the ground, in lumps of all shapes and sizes. It is supposed to have been distilled by Nature from a species of conifer. It is worth $200 a tun in New Zealand for making varnish. There are also some good specimens of the *phormium tenax* or New Zealand flax, worked into ropes and mats, and an interesting collection of garments, weapons, etc., of the Maoris, besides industrial products of all kinds.

Tasmania shows principally wool, wheat, and the dressed furs of a number of singular animals found only in the Australian group, including the platypus, kangaroo, wirubut, bandicoot, and the Tasmanian devil. There is a curious jelly for table use among the food productions, made of seaweed, and a photograph of the last aboriginal Tasmanian, the sole member of a race supposed by Haeckel to be nearest of all to our alleged monkey ancestors.

Ceylon sends coffee, nutmegs, tapioca, pepper, gums, and gamboge, all raw products. Singapore sends a similar display, with the addition of some plumbago, and an elephant carved in that material by a native. Mauritius displays samples of arrowroot, sugar, medicinal plants, and a collection of ethnological types. The Archipelago of Seychelles, a dependency of Mauritius, sends sixty-seven varieties of woods, besides cocoa, cloves, and coffee.

The Cape of Good Hope covers the inside of the allotted section with skins of wild animals and elephants' tusks, and crowds the space inside with ostrich plumes, dried plants, wools, etc. There are some curious necklaces and bracelets of melon seeds and steel beads, ostrich eggs converted into cups and card baskets, and a model of a leviathan incubator, flanked by two ostrich chicks as specimens of its work. The Gold Coast colony exhibits curiously artistic gold ornaments and wood carvings, the work of natives.

Jamaca, West Indies, displays nuts, barks, spices, rum, arrowroot, and yam flour, breadfruit meal, cassava starch, coffee grown at 5,000 feet above the sea level, said to be the finest in the world; beautiful fancy articles made from a lace bark of the lagetta tree, and artificial flowers, looking like wax work, but formed from the cuticle of the leaf of the *Yucca alvifolia*. The Bahama Islands send exquisite wreaths and sprays made from little pearly white shells, baskets made of mimosa beans, and specimens of tortoise shells, sponges, etc. Bermuda contributes corals, palm leaf fans, cups and boxes of cedar, and a model of the great floating dock, besides sending frequent shipments of vegetables to Agricultural Hall. From Trinidad we have fifty-seven samples of native woods, crude gutta percha, Angostura bitters, crude asphalt from the great Pitch Lake, and various vegetable fibers adapted for cordage. Guiana sends samples of sugar and rum.

This completes the list of the productions of the English colonies: a display which for completeness and instructive value is, as a whole, one of the finest in the great Fair.

Progress of the Railway Tunnel under the Hudson River, New York city.

In April, 1875, we gave the details and drawings of the Hudson River Tunnel, projected by Mr. D. C. Haskin, of this city, and designed to establish direct railway communication between New York city and Jersey city. The work was begun by commencing a vertical shaft of brick masonry, 30 feet in diameter and 4 feet thick, at the junction of Jersey avenue and 15th street, on the New Jersey side, between the present depots of the Erie and Delaware and Lackawanna railways. After the shaft had reached a depth of about 20 feet, the Delaware and Lackawanna Company commenced legal proceedings to stop the work, obtained injunctions, etc., and, by resort to various legal quibbles, managed to delay the enterprise until the present time. The Hudson River Tunnel Company has, however, come off finally victorious, the injunctions are removed, and the construction is now to be proceeded with. It is understood that the wealthy Senator Jones, of Nevada, furnishes the capital, the estimated cost being ten to fifteen millions of dollars. The shaft on the Jersey side is to be carried down 65 feet. The horizontal tunnel under the river will then be commenced. The latter is to be 26 feet in diameter.

A NEW TEST COLOR.—The flowers of the violet and iris have recently been found to yield a very fine blue color, which is a more delicate test for acids and alkalies than the solution of litmus commonly employed. The name of the new color is phyllocyanin. It will probably before long find its way into all chemical laboratories.