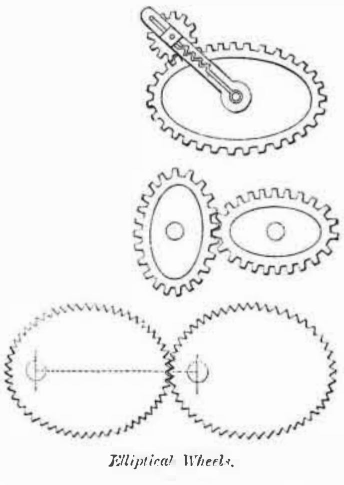
In Fig. 7

ELLIPTICAL WHEELS


Elliptical Wheels.

are represented. These are used where motion of varying speed is required, and the variation is determined by the relation between the lengths of the major and minor axles of the ellipses. In the upper figure variable rotary motion is produced by uniform rotary motion. The small spur pinion works in a slot cut in the bar, which turns loosely upon the shaft of the elliptical gear. The pinion is kept to its engagement by a spring on the shaft. The slot in the bar allows for the variation of length of radius of the gear.

THE INDUSTRIES AND RESOURCES OF JAPAN.

Japanese manufactures are of great interest to foreigners, primarily in consequence of the raw materials (often un known in other countries) of which they are made, and secondly on account of the various processes used in their production, processes invented in the long course of patient manual labor, which left to each artisan a free field for his exertions to simplify his work or to produce some new and original object.

With reference to the social condition of industry, it should be stated that there are but very few workshops, of any size or importance, giving employment to more than 30 or 40 persons, and that in most places the manufacturing is done on a small scale. Heavy machinery, with the exception of water wheels, is not used; but the hand tools are in general very well adapted for their purposes; and in several branches of industry, such as, for instance, in fan making, in the manufacture of porcelain, etc., the division of labor is carried on to a great extent. Of later years not only the government, but also the private people, have made great efforts to create larger industrial establishments. Several paper mills have been erected in Tokio, Kiyoto, and Osaka; cotton mills, silk-reeling establishments, with steam or water power, are to be found in different places; a glass furnace has been built in Tokio; sulphuric acid works in Osaka; soap manufactories are at work in Tokio and other places. The streets of Yokohama and of a great part of Tokio are lighted by gas made of the coal mined in Milike, province of Chikuzen; several machine shops and gun manufactories have been established by the government in Tokio, Osaka, Nagasaki, and the arsenal of Yokoska is very completely organized for the purpose of shipbuilding. At the same time, more liberty has been conceded to trading in general, and the old restrictions have been abolished without producing any of those perturbations which have so frequently taken place in Europe in consequence of reforms effected in connection with the social condition of industry.

To these remarks of general character we now extract some special notes concerning the various industries of the country, from the official Japanese Centennial catalogue, limiting our observations either to some characteristic features of a technical kind, or else only pointing out the peculiar nature of the raw materials used in the manufacture of the articles exhibited.

CHEMICALS.

Salt is used in large quantities for the ordinary food, and the preservation of fish and vegetables. It is exclusively produced from sea water by solar evaporation in large salt gardens, composed of a series of fields, the soil of which has been hardened and afterwards covered with a layer of sand. The clean sea water, flowing in through a perfect network of small ditches, is sprinkled over the fields by the workmen, the operation being repeated three times at intervals of a few hours. The sand is then raked together and carried for lixiviation to the filters, which consist of small square wood tanks, 4 by 4 inches, having a bottom of bamboo, covered with straw and mattings. The concentrated lye running out from these filters is first stored in covered wells, and then brought to the evaporating pans through wooden pipes. These pans are not always of the same construction. In some places they consist of low vaults, built of large pieces of slate, covered with gravel and mud, so as to fill up the interstices, and to form the bottom of the pan, which is surrounded by a low mud wall. This vault has an opening on one side for the insertion of fuel, and another on the other side leading into the flue

In other places, a very curious kind of a pan is used, which is constructed in the following manner: A low wall is built, enclosing a space of 13 by 9 inches, the bottom forming a kind of prismatical depression, 3 inches deep in the center. An ash pit, 3 feet deep, is then excavated, starting from the front wall, and extending about 4 inches into this depression at its deepest place; it communicates with the outside by means of a channel, sloping upwards, and passing underneath the front wall. The ash pit is covered by a clay vault, with holes in its sides, so as to establish a communication between the ash pit and the hollow space under the pan. This vault is used as a grate, the fuel (brown coal and small wood) being inserted through a door in the front wall. The air draft necessary for burning the fuel enters partly by the fire door, partly through the ash pit, and the openings left in the vaulted grate. Through these same openings the ashes and cinders are from time to time pushed down into ash pit, for which purpose small openings are left in the side wall of the furnace, through which the rakes may be introduced. A passage in the back wall, supporting the pan, leads off the results of combustion and the hot air into a flue gradually sloping upwards, and ending in a short vertical chimney. At the lower part, some iron kettles are placed in the flue for the purpose of heating lye before it is ladled into the evaporating pans. With reference to the pan, it is made in a way which requires a great deal of skill and practice. In the first place beams, reaching from one side to the other, are laid upon the top of the furnace walls, and are covered with wooden boards, forming a temporary floor. Two or three feet above this floor a strong horizontal network of wooden poles sustain a number of straw ropes, with iron hooks hanging down, and of such length that the hooks nearly touch the wooden floor. The floor is thereupon covered with a mixture of clay and small stones, 4 to 5 inches thick, the workmen being careful to incrustate the iron hooks into this material. It is allowed to dry gradually; and when considered sufficiently hardened, the wooden beams and flooring are removed with the necessary precautions. The bottom of the pan remains suspended by the ropes. The open spaces left all around, between the bottom and the top of the furnace walls, are then filled up, and the border of the pan, 9 or 10 inches high, is made of a similar mixture. It is said that this extraordinary construction lasts 40 to 56 days when well made, and that it can be filled 16 times in 24 hours, with an average of 500 quarts of concentrated lye at each filling. The salt, when removed from the pan, is placed in baskets, so as to allow the adhering lye and part of the deliquescent impurities to drip off; afterwards it is spread out with a layer of sand underneath, in order to dry. The purity of the salt, which differs in quality, depends upon this last treatment.

OILS, SOAPS, ETC.

The oil ordinarily used in Japanese households is the rapeseed oil, produced from the seeds by heating, crushing, and finally pressing them with a kind of roughly made wedge press; in short, it is prepared by a series of operations similar in principle to the European processes. The lamps are merely flat saucers, and the wicks consist of two or three pieces of the white and soft pith of the *juncus effusus*, which are laid into the saucer, and lighted by the end projecting above the edge of the vessel.

But the most important article for illuminating purposes is the candle made of vegetable wax, which is mostly composed of palmitine. It is produced from the fruit of several trees belonging to the genus *rhus*, among which the *rhus succedanea* is the most important, and is grown among vegetables, more or less extensively, almost everywhere in Japan, especially in the western provinces, from the south northwards to the 35th degree. The lacquer tree *rhus vernicifera*, also yields wax, and differs in appearance but little from the wax tree; its geographical limit extends further northwards, being at the 38th degree. Finally, the *rhus sylvestris*, or wild wax tree, should be mentioned. The cultivated wax tree was originally imported from the Loo-choo islands; but the growers of the tree now distinguish seven different varieties. The berries, of the size of a small pea, and united in bunches, contain the wax between the kernel and the outer skin; they are crushed, winnowed, steamed, placed in hemp cloth bags, steamed again, and afterwards pressed in a wooden wedge press, all by hand. In order to facilitate the flow of the wax, a small percentage of *pe no abura* (oil from *perilla ocimoides*) is added. The raw product, of a greenish color, is made into square cakes, and reduced to small scraps by means of a kind of planing tool, then washed and bleached by the sun and air, whereupon it assumes a pure white color. In ordinary candlemaking the unbleached wax is used, and the manufacturing is done by repeated dipping and rolling on the flat of the hand, in order to smooth and harden the successive coatings. The wicks are made by rolling a narrow strip of Japanese paper in a spiral line around the upper part of a pointed stick, and twisting it at the upper end, so as to prevent its getting loose. Two or three strings of the pith of *juncus effusus* are then rolled around this paper, in close spiral lines, and fastened with a few fibers of silk waste, so that the wicks can be taken off from the stick, and sold in bundles to the candle maker. The latter places the wicks again on sticks, takes half a dozen of them in his right hand, dips the wicks into the melted wax, and rolls them upon the palm of the left hand, repeating these operations till the candles have grown to the proper size For the outside coating, occasionally white wax is used. These candles are made of all dimensions; for ceremonies and similar occasions candles of bleached wax are used, of a fanciful shape and painted with bright colors. The art of candle making is said to have been introduced from Loo Choo, towards the end of the 16th century. Before, this time pieces of resinous wood or paper dipped in oil were used.

Another tree yielding a kind of vegetable tallow is the *cinnamomum pecundulatum*. This, however, is seldom cultivated, as, in consequence of its being an evergreen plant, it would cast too much shadow on the other plants cultivated underneath.

An insect, producing a kind of wax very much like or perhaps identical with the Chinese *pela*, lives upon the *ligustrum Ibota*. The insects, in clustering round the thin branches, form by their secretions lumps of a slightly transparent white wax, of a crystalline construction and a very high melting point

A very fine oil is extracted from the seeds of a certain species of camelia, and, either flavored or unflavored, is used for the hair or for pomades, which consist of a mixture of camelia oil and vegetable wax.

PAINTS, PIGMENTS, VARNISHES, ETC.

The most interesting product appertaining to this class is undoubtedly the Japanese lacquer (*urushi*), celebrated all over the world for its excellent quality and great beauty This valuable article is almost entirely a product of Nature and requires but a few mechanical operations to be ready for use. It consists merely of the sap of the *rhus vernicifera*, which is cultivated especially for the production of lacquer, chiefly between the 33° and 37° of N. latitude. The trees when 5 years old are regularly tapped from the end of May until the end of October, incisions being made in the bark, extending about one quarter of the trunk's circumference, and just deep enough to reach the wood. On the incision being made, clear sap flows out, mingled with a very white milky substance, which darkens very soon when exposed to the air, and gradually assumes a dark brown and almost black color. At first these incisions are made at about 14·04 inches distance one from another, on alternate sides of the trunk, and the lacquer is taken off with an iron spatula as soon as it has filled the incisions. After an interval of three or four days new incisions are made, close above and below the former cuttings. Proceeding in this manner until the end of the season, the whole tree becomes covered with incisions, and has to be cut down. The branches are lopped off, soaked in water, and also tapped, by means of incisions made in a spiral line. The lacquer taken from the branches becomes very hard, and is therefore mostly used for priming; its name is *seshime urushi*. In the more northerly part of Japan, where the lacquer tree is cultivated with the additional view of producing wax, the tapping is done on a small scale only, so that the tree need not be cut down, but may yield lacquer and wax for a number of years.

The quality of the crude lacquer (*ki-no-urushi*) depends upon the season in which it has been tapped, and also upon the circumstances of climate and soil, as well as on the care bestowed on the cultivation of the tree. The raw produce is a viscous liquid of a dirty gray color, always covered with a dark brown skin where it comes into contact with the air, and mixed with particles of the bark of the tree and other accidental impurities. Having been placed in small wooden tubs lined with paper, it is allowed to settle gradually; the produce separates into a thinner and finer quality in the upper half, and a thicker and less good quality which settles in the lower half, of the tub. Both are separated by decanting, and are strained through cotton cloth. The superior quality of lacquer is stirred in the open air in order to allow a certain excess of water to evaporate, after which process it assumes a brilliant dark brown or nearly black color; in thin layers it appears transparent, with a brown color similar to that of shellac. The further operations which the lacquer undergoes before being ready for use are generally effected by the workman himself before using it; they consist of mixing it with powdered substances, with a view of either hardening or coloring it, and of straining the pure lacquer, or the mixture, through a peculiar long-fibered paper called *yashino-gami*, made for this purpose. The *shunkei urushi*, a kind of lacquer which has to undergo no grinding or polishing, and which is supposed to acquire sufficient brilliancy by mere hardening, is made by mixing the pure lacquer with a small quantity of the *ye-no abura* mentioned above. This lacquer is used in a manner similar to the foreign shellac or copal varnishes for furniture, upon which it forms a brilliant transparent coating of a yellowish tint, through which the veins of the wood remain visible.

A most interesting operation is that by which the celebrated black laquer (*roiro-urushi*) is produced. This is effected without the addition of any solid particles, such as lampblack or similar substances, but merely by stirring the crude lacquer for one or two days in the open air, whereupon it assumes a very dark brown color. Towards the end of the operation a small quantity of water, which has been allowed to stand for a few days mingled with iron filings, or a gall nut infusion darkened by the addition of iron is added, and the whole stirred again until part of the water has evaporated, whereupon the lacquer acquires a proper consistence and color. The addition of this water is said to be absolutely necessary for producing the highest brilliancy and darkness of the lacquer. The operation as described above is indispensable; but there are a few unimportant modifications, since the manufacturers sometimes add a solution of gamboge or a decoction of the yellow fruits of *gardenia florida*, or other liquid dyestuffs, for the purpose of improving or modifying the color of the varnish.

Among the peculiar properties of lacquer it may be mentioned that it is rather poisonous, and often produces eruptions on the skin, or swollen faces, or headaches, etc.; how ever, the effects are not the same upon all persons; most people get accustomed to it, others are not affected at all by it. The manipulations of coating and painting with lacquer will be described in another article.

Japanese writing inks are very much like Chinese, and manufactured in a similar, though perhaps not quite identical, way. The body of the ink is soot, obtained from pinewood or rosin, and lampblack from sesasum oil for the finest sort. This is mixed with liquid glue made of oxskin. This operation is effected in a large round copper bowl, formed by two spherical calottes placed one inch apart, so that the space between can be filled up with hot water to prevent the glue from hardening during the time it is mixed by hand

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with the lampblack. The cakes are formed in wooden molds and dried between paper and ashes. Camphor, or a peculiar mixture of scents which comes from China, and a small quantity of carthamine (the red coloring substance of safflower) are added to the best kinds for improving the color as well as for scenting the ink. There is a great difference both in price as well as in quality of the various kinds of ink, the finest article being rather costly. The most renowned manufactory is in Nara, the old capital of Japan, in the province of Yamato.

[For the Scientific American.]

THE OCEANIC CIRCULATION CONTROVERSY.

The question as to whether the circulation of the ocean is due to winds or to gravitation is one that is now widely and warmly discussed. Most of this contention seems to collect around two men as nuclei: one is Mr. James Croll, who holds to the wind theory, and the other Dr. W. B. Carpenter, who attributes circulation to the opposite effects of tropical heat and arctic cold. The effect of winds upon the surface of water is far from inconsiderable. We can see this from the results observed on our eastern coast. "It is well known," says Professor Newcomb, "that the tides are there materially modified by the winds, so that the time of high water may be delayed or accelerated by an entire hour or more, and the hight changed by one or more feet in consequence of a heavy wind. The effects of a wind thus determined must be the same as that of a difference of level equal to that which the wind is found to produce, and this again must be sufficient to produce a very strong surface current. Moreover, a continuous surface current must, in time, extend itself to a great depth, through friction." On a long sloping beach, the wind is often known to blow the water seaward to such an extent that ships at anchor near the shore in high tide, instead of being able to set sail in a succeeding high tide, have been left on a dry beach. In the passage of the Israelites through the Red Sea, we are told that "the Lord caused the sea to go back by a strong east wind all that night, and made the sea dry land." Observations in connection with the survey of the Suez Canal route have revealed the fact that at the probable place of crossing was a sand bar, but a little beneath the surface, which is now visible above the surface. The strong east wind was sufficient to force back the water from this sand bar and make a dry passage way. So this statement of Scripture is in strict accord with the discoveries of science.

On the other hand, adherents to the gravitation theory hold that, as water is heated by the sun at the equator, and cooled by want of it at the poles, the cold and hence heavier water of the north must sink and crowd under the warmer and lighter water at the equator, thus causing circulation. The movement-forming currents in the air are explained on the theory that the heavy air descends, crowding up the air made lighter by the expansive power of heat. The result of this is seen in the northeast and southwest winds from the poles to the equator, and the probable upper currents in the opposite direction. This is the accepted explanation of atmospheric circulation; and since the water—though less mobile—is nearly a perfect fluid, the same cause would reasonably be expected to produce a similar effect in the ocean. While these two theories, when simply stated, seem almost equally plausible, the friends of each find many objections to an acceptance of the other.

Much has been said about the Challenger's "crucial test" of these opposing theories. This has been advanced by Mr. Croll in opposition to the gravitation theory. Mr. Croll rightly remarks that, for gravitation to act, the surface at the equator must be elevated above that at the poles and all intermediate points. By referring to Dr. Carpenter's oceanic section which is most favorable to the latter's theory—which section is remarkable for the thinness of the warm strata at the equator compared with the greater thickness of the heated water in the North Atlantic—he concluded that the ocean, to be in equilibrium, must stand at a higher level in the North Atlantic than at the equator. To verify this conclusion, Mr. Croll examined the temperature soundings of the Challenger expedition taken near the equator, in 23° and 38° of north latitude; and he computed the variation in the hight of these three columns of water due to the temperature indicated, by the use of Muncke's table, showing the expansion of sea water for different degrees of temperature. He afterwards corrected his computations by comparing them with results obtained from the use of Hubbard's table, and found that the column of water at 23° north latitude must stand 2 feet and 3 inches, and at 38°, 3 feet and 3 inches, higher than at the equator, in order to produce equilibrium. This shows that the north latitude waters must stand higher than the equatorial, and that in fact the surface does slope up from the equator to nearly the latitude of England. Hence, if the circulation from the equator to the pole is due to gravitation, the water must literally run up hill. And Mr. Croll says we might as soon expect the waters of the Gulf of Mexico to flow back into the Mississippi and Missouri rivers by force of gravitation.

From the data Mr. Croll has given from the records of the Challenger, it is somewhat difficult to see how he reaches his conclusions. For, taking the temperature soundings as he has given them, and finding the mean of temperature for the three latitudes above mentioned, we find the mean temperature of the water columns for the soundings to be a little over 51° at the equator, nearly 45½° in latitude 23° north, and about 46° in latitude 38° north. According to this, to produce equilibrium, the column would necessarily be highest at the equator, because expanded by greatest amount of heat, next highest at latitude 38°, and lowest at 23°. Hence there would be a depression in the surface, and then an elevation as we go from the equator to the pole; but as the equatorial surface is higher than the elevation north of it, the force of gravitation could doubtless cause a northerly flow to the surface water. This result, however, does not suit Mr. Croll's purpose, and is evidently not the one which he obtained, though, as far as we can see, legitimately and naturally reached by use of his own data. But if we take in each of the three columns (representing the three latitudes) the mean temperature of only those soundings which correspond in depth in all columns, we obtain results just suited to Mr. Croll's purpose, which represent conditions essentially alike those which he presents as necessarily existing from Dr. Carpenter's section and the Challenger's soundings, namely, 42° at equator, 45° at latitude 23°, and 46° at 38°, or a gradual elevation of surface from the equator to the North Atlantic. This is presumably the method of calculation by which he reached his conclusion.

Mr. Croll further notices that Dr. Carpenter's section south of the equator furnishes an argument for the wind rather than for the heat theory. This section reveals the fact that the amount of warm water north of the equator is much greater than south of it, while, according to the heat theory, the reverse should be the case, because of less obstruction to circulation south than north of the equator. Dr. Carpenter anticipates this objection by explaining that the warm water is in excess north of the equator because "the upper stratum of the North Atlantic is nearly as much cooled by its limited polar outflow as that of the South Atlantic is by the vast movement of antarctic water which is constantly taking place toward the equator." "But," answers Mr. Croll, "this 'vast movement of antarctic waters' necessarily implies a vast counter movement of warm surface water. So that if there is more polar water in the South Atlantic to produce the cooling effect, there should likewise be more warm water to be cooled." Mr. Croll declares this fact is easily explained on the wind theory, by noting the fact that the southeast trade is stronger than the northeast, and hence, by overpowering the northeast trade and blowing across the equator, would sweep the preponderance of warm water into the Gulf of Mexico, where it has time to be heated, and then to the north, where it accumulates.

Mr. Croll is apparently a little inconsistent in the following: "There is an additional reason to the one already stated why the surface temperature of the South Atlantic should be so much below that of the North. It is perfectly true that whatever amount of water is transferred from the southern hemisphere to the northern must be compensated by an equal amount from the northern to the southern hemisphere; nevertheless, the warm water which is carried off the South Atlantic by the winds is not directly compensated by water from the North, but by the cold antarctic current, whose existence is so well known to mariners from the immense masses of ice which it brings from the Southern Ocean." So it is not directly compensated from the north at all, but from the south. And, from all he says, we might expect a constant accumulation around the north pole at the expense of the south. If it is not directly compensated from the north, how is it indirectly? While Mr. Croll leaves us in the dark respecting this important question, we find an explanation in Professor Wyville Thomson's Challenger "Report to the Hydrographer of the Admiralty." He says: "The more the question is investigated, the less evidence there seems to me to be of any general ocean circulation depending upon differences of specific gravity. It seems certain that both in the Atlantic and Pacific the bottom water is constantly moving northwards; and I am now very much inclined to refer this movement to an excess of precipitation over the water hemisphere, a portion of the vapor formed in the northern hemisphere being carried southwards and precipitated in the vast southern area of low barometric pressure." Want of space forbids remark on this explanation.

Mr. Croll again notices, from Captain Nares's report of Challenger Expedition, that, from 50° to 65° of south latitude, water to the depth of 600 fathoms—excepting a thin stratum at the surface heated by the sun's rays—was several degrees colder than the water below it; and declares this entirely inconsistent with the gravitation theory, according to which the colder should sink beneath and displace the warmer. Carpenter answers this quite satisfactorily by saying the cold water, according to Captain Nares's distinct statement, comes from the melting of field ice, and would have less salinity, hence less specific gravity, than the salt though warmer water beneath. The truth of this, however, depends upon mathematical computations from well ascertained data, and not upon theory.

To Mr. Croll's first crucial test argument, Dr. Carpenter at first replied that the doctrine to which Mr. Croll applied his test was a creation of his (Croll's) own, since his whole argument was based on the assumption that the ocean was in a state of static equilibrium, whereas Carpenter claims that it never can be in equilibrium so long as part of it is cold and the other part warm. And he illustrates it by a boiler and water pipes for heating, and claims that equilibrium exists till heat is applied, and then can exist no longer, and circulation necessarily commences. In one of his communications later in the series, Dr. Carpenter replies, as if it were an afterthought, that Mr. Croll "has entirely omitted the consideration of the inferior salinity of the equatorial column." This, he says, would make a difference in the opposite direction sufficient to neutralize the three feet and over of excess in the elevation of the North Atlantic column of water. To Dr. Carpenter's former point, Mr. Croll replies that considering the ocean in equilibrium was an advantage in his opponent's favor: the former granting that it never attains such a condition, and that, on the latter's supposition, a disturbance of equilibrium would necessitate that the North Atlantic elevation above the equatorial surface be greater than Mr. Croll has computed, and hence so much less liability for the water to move to the north by its weight. "It is singular," says Mr. Croll, "that Dr. Carpenter should not have observed that his objection strengthens my argument instead of weakening it. For if it be true that the equatorial column, though in a state of constant upward motion, never attains to the hight required to balance the polar column, then it must follow, as a necessary consequence, that the rise from the equator to latitude 38° in the North Atlantic must be greater than I have estimated it to be; and therefore, so much the more impossible is it that there can be any surface flow from the equator to the pole due to gravity." There seems to be a little want of candor or some misunderstanding in this reply; for it supposes the lack of equilibrium to result in a movement of surface water from the north toward the equator; and neither partly believes this the true direction. Mr. Croll's strong point seems to be that water will not run up hill by the force of gravity. But if the North Atlantic is over three feet higher than the equator, why does it not run down hill by force of gravity? Or, since it is in equilibrium as it stands, is it not as likely to run one way as the other?

Respecting Dr. Carpenter's latter objection, Mr. Croll expresses doubts as to the inferior salinity of the equatorial column to any great depth, though granting it to be a fact as far as the surface is concerned, and claims this as additional evidence in favor of his theory; but in what way, he fails to make clear, especially when he afterwards admits that he has made allowance for differences in salinity, to the advantage of the other theory.

There has been considerable sparring between the opposing parties concerning the viscosity of water in its effects upon this question; but while one concludes that it has nothing whatever to do with the question at issue, the other says that it is so slight that it may well be entirely ignored. Hence the *pro* and *con* on this point need not be noticed.

After the long and determined controversy, which is here but briefly epitomized, it seems a little strange that each has virtually admitted the correctness of his antagonist's position. Mr. Croll remarks: "Everyone will admit that, were there no other agencies at work but equatorial heat and polar cold, a difference of temperature would soon arise which would induce and sustain a system of circulation, but this condition of things is prevented by the equatorial waters being swept away by the winds as rapidly as they are heated." To this, we would simply remark: There appears no good reason why "this condition of things" should be "prevented" by the winds, and might not exist in its degree at the same time. On the other hand, Dr. Carpenter asserts: "I have never denied the existence of a horizontal wind circulation." And in another place: "It is scarcely fair in Mr. Croll to continue speaking of the wind theory and the gravitation theory of ocean circulation as if they were antagonistic, instead of being not only compatible but mutually complementary—the wind circulation being horizontal, and the thermal vertical." In view of these concessions, it may not be unreasonable to conclude that ocean circulation is due to both causes working together, and that we have not yet sufficient data for finally deciding which produces the greater effect, though, perhaps, the probabilities are in favor of the wind.

S. H. T.

The American Chemical Society.

This is a new organization, lately formed in New York city. The objects of the society are the encouragement and advancement of chemistry in all its branches.

The society consists of members, associates, and honorary members.

Only chemists are eligible as members or honorary members. The following are the managers:

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Capsizing of a Yacht.

The magnificent yacht Mohawk, probably the largest pleasure sailing vessel in the world, was recently capsized in New York Harbor, by a sudden squall. The vessel was getting under way under all plain sail, when a heavy gust struck her, throwing her almost on her beam ends. As she righted, another squall threw her back, and her heavy wet canvas pulled her over so that in a short time she filled and sank. Mr. William T. Garner, Vice Commodore of the New York Yacht Club and owner of the vessel, his wife, and three others were drowned. The Mohawk was 150 feet long and of 30 feet beam. Her construction was of the strongest description, and her interior fittings were palatial.

Mr. Garner was one of the largest print cloth manufacturers in the country, owning five large cotton mills at Cohoes, besides many others in various parts of New York State. He employed from 7,000 to 8,000 workmen, and in his cloth-printing factories ran 42 machines, this being dou-

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