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NEW YORK, SATURDAY, NOVEMBER 28, 1903.

The editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

THE TRUTH ABOUT THE BELLEVILLE BOILER.

Why is it that the French engineers of the Messageries Maritimes have pronounced the Belleville boiler an unqualified success, and Englishmen condemn it as a costly failure? The boiler, it is true, is a French invention; but patriotism alone never persuaded Frenchmen to introduce it in the navy. Moreover, the Independent Boiler Committee, whose recommendations the British Admiralty largely followed in adopting the boiler, had decided in no uncertain terms that the Belleville was the best boiler on the market. And yet, despite this strong praise from an unbiased jury, the boiler has sometimes failed in a way that could not but occasion uneasiness.

In the current issue of the SUPPLEMENT, Mr. Archibald S. Hurd very carefully analyzes the problem which has confronted the British Admiralty, and has proven quite conclusively that the varying success which has attended the use of the Belleville boiler in France and in England is to be attributed to two causes—the one British variations from the inventor's designs, the other British unfamiliarity with the working of the boiler.

It might be supposed that, having decided to adopt the Belleville boiler, the experience of the inventor would have been drawn upon by the Admiralty. Moved largely by Parliamentary objections to the use of a French invention in a British warship, however, the Admiralty thought it expedient to modify the plans to suit the British ideas. Workmen, utterly ignorant of the niceties of construction learned by the French makers, blindly began the building of the boilers for the navy. In France welded tubes had been employed. In England solid-drawn tubes were substituted. Other alterations were made of questionable merit, all of which increased the cost of the boiler at least one-third.

Ships equipped with boilers made after a pattern which was probably unsanctioned by the inventor, were placed in commission with an engine-room staff that knew little or nothing of the practical working of the new steam generator, except that it required more nursing than the Scotch boiler and that it needed more careful stoking. The older men, in particular, looked askance at the innovation. Even if they knew enough about the boiler, they were little disposed to give it a fair trial. It happens frequently enough in the British navy, not only that engineer officers are placed in charge of boilers and engines about which they are technically ill informed, but also that the number of these officers is wofully insufficient for the task assigned to them. Is it any wonder that breakdowns occurred?

The more intimate the engineer's acquaintance with the machinery which is intrusted to his care, the greater will be the efficiency of that machinery as time passes. In a fighting-ship perhaps more depends upon the man who gets up steam than upon the much-praised man behind the gun. And yet a few months ago the military prestige of Great Britain depended upon warships with men in the engine room who were anything but familiar with the boilers they were called upon to supervise.

That the chief reasons for most failures of the Belleville boilers in British ships are to be found in the uncalled-for modifications of the French type and in the lack of skill of British engineers, Mr. Hurd has shown by many a striking example. After much delay and at no small cost, the British authorities learned how to make the boiler, and trained a large number of officers and men in its use. The result was magical.

Within the last few months ships which have been fitted with the Belleville boiler have more than justified the expectations of its most ardent advocates. Of the twenty-six battleships and forty-three cruisers which took part in the recent naval maneuvers, but one vessel broke down, and that was the "Blake," fitted with Scotch and not with Belleville boilers. Twenty-one of the ships had been equipped with the French steam generator. Each of the vessels during the preliminary operations was made to cover a distance of from 2,000 to 2,500 miles. And yet in no instance were the boilers found wanting. Perhaps the most striking illustration of the efficiency of the boiler was afforded by the remarkable run of the cruiser "Good Hope" during the maneuvers. She took on coal at Portland, and steamed for the Azores at a speed of eighteen knots. There she received orders to chase one of the cruisers of the opposite side. She had slowed down to nine knots for over half an hour to communicate with the senior Admiral, Sir Arthur Wilson, but in seven minutes she was traveling through the water at nineteen knots, and in half an hour she was speeding at twenty-two and one-half knots, with still enough steam to enable her to move even faster. For three hours and a half and more, she kept up this speed. Then the quarry, which had a start of ten miles, was overtaken. The vessel then proceeded to Lagos on the Portuguese coast. She arrived in good order for the series of tactical exercises which had been planned for the combined British fleets.

Still another remarkable example is afforded by the cruiser "Spartiate," whose reputation as a ship is anything but enviable. For six years her construction had been delayed. When she was at last completed, her trials proved her a most unsatisfactory vessel. On March 17 last, she left England for Hong Kong with a relief crew for the battleship "Ocean." Although two of her engineer officers were familiar with the working of her Belleville boilers, only about twenty of the stokers and artificers had had previous experience with the new generator. Nevertheless, the run of 9,600 miles to the far East was creditably covered at an average speed of thirteen knots with a coal consumption of but 3,000 tons. The best previous records for the same trip in coal consumption were those of the cruiser "Amphitrite," which burnt 4,200 tons, and of the "Blenheim," fitted with cylindrical boilers and displacing 2,000 tons less, which burnt 4,000 tons, although the average daily speed was only eleven and one-half knots.

Some time must necessarily lapse before the true history of the Belleville boiler is written. The experience gained within recent months proves, however, that the introduction of the boiler will be attended with the same success which marked its use in the Messageries Maritimes. Too much haste has been shown in condemning a system only too imperfectly understood in England. Whether the Belleville boiler or one of its half dozen rivals will ultimately be selected by naval engineers, no one can tell. This much at least is certain—the water-tube boiler as an adjunct to a fighting-ship has come to stay.

FIREPROOF METALLIC CARS AND A PROTECTED THIRD RAIL URGENTLY NEEDED ON ELECTRIC ELEVATED AND TUNNEL RAILWAYS.

The collision which occurred on the Fifth Avenue line of the Brooklyn Elevated Railway early in the evening of November 19, by which a motorman and a conductor were killed and some half dozen passengers were seriously injured, should sound a note of warning to the management of the new Rapid Transit tunnel road, and cause the operating company to pause before equipping the road with cars that are not surely incombustible, even in the intense heat of electric arcs that generally occur when there is a collision.

In the accident referred to, an empty train was proceeding toward New York, when a fuse blew out, extinguishing the lights and bringing the train to a standstill. Whether oil danger lights were burning on the rear end of the train or not, is not definitely known; but the action of the conductor in immediately attempting to reach its rear end with a red lantern (as a result of which he lost his life) would perhaps indicate that the lights were not in place. Otherwise, it seems improbable that the motorman of the following train, which was well filled with passengers, would not have seen the lights in time to stop, as this train crashed into the empty one on a straight track and under perfectly clear weather conditions. At the same instant that the collision occurred, there was a loud explosion, and flames shot up from beneath the car at its forward end, setting it ablaze almost before the badly shaken-up and injured passengers had time to crowd back into the rear cars. Although thrown from the track, and telescoped into the two rear cars of the forward train, the head car fortunately did not fall from the elevated structure. Firemen were called, and they rescued four trainmen from the burning rear car of the forward train by means of ladders, which they put up from the street to the track. The passengers of the second train made their way back with difficulty to the Thirty-sixth Street station, in constant danger of stepping on the live third rail. The collision occurred alongside of Greenwood Cemetery, and two passengers and a guard jumped to the ground to escape from the burning train. The inefficiency of the railway company in case of accident is shown by the fact that it was an hour and a half before a rescue train arrived. The motorman was found dead at his post, his body being badly charred; and the conductor of the forward train was found in the rear car, lantern in hand.

The accident is a forcible reminder of the dangers of third rail electric traction as carried on to-day in many of our leading cities; and it has again demonstrated that, despite signals, automatic devices, and all precautions, the failure of one individual to perform his duty, either from neglect or accident, may precipitate a disaster of the most terrible kind. When one thinks of the lives that would have been lost had the collision occurred between two of the many densely-packed trains that return from New York daily in the early evening hours, a shudder involuntarily goes through one at the thought of the havoc that would have been wrought, and that is now constantly menacing.

It is evident the time has now arrived for some legislative enactment compelling the use of fireproof metallic cars, proved by an actual fire test to be incombustible, and substantially constructed to withstand the shock of a collision in a far greater degree than is ordinarily possible, as well as of protected third rails, which, if they will not cease arcing in case of short circuits, will, at least, be incapable of setting anything afire, or of giving to escaping passengers death-dealing shocks. Such a law could doubtless be applied with benefit to the rolling stock of all electric street car lines, but in the case of elevated and tunnel roads, it seems an absolute necessity for the proper protection of the public.

GOVERNMENT TESTS OF THE LAKE SUBMARINE BOAT.

The government tests of the Lake submarine boat are being held at Newport, R. I., during the last two weeks in November. An outline of the programme for these tests was given in our November 14 issue, where it was stated that a competitive trial between the Lake boat "Protector" and the Holland boat "Fulton" would be held. The Holland boat failed to put in an appearance, and so there will not be an opportunity of comparing the two leading types of American submarine boats as to their ability to maneuver in the open sea, as was hoped. The "Protector" demonstrated her seaworthiness in a run from Bridgeport, Conn., to Newport, R. I., where she went to report for the trials, as she covered the distance at an average speed of nearly 7 miles an hour, with a sloop and a launch in tow, and during rough weather. We are not aware that any boat of the Holland, or diving, type has ever been run outside of land-locked waters, and incapability of negotiating heavy seas may therefore be one of the reasons for the non-appearance of the "Fulton." The Lake boat is an improvement in this respect at least over the half-dozen odd submarines now owned by our government, and it is to be hoped that the test will result in showing other improvements of secondary importance that the inventor claims are incorporated in the "Protector."

PHOTOGRAPHIC PRINTS WITHOUT LIGHT.

"Katatypes" is the name given by the inventors, Ostwald and Gros, of Leipzig, to prints made from photographic negatives without the aid of light. The process is based on the properties of peroxide of hydrogen and on the formerly mysterious chemical phenomenon which is known as katalysis. By katalysis is meant the production of a chemical reaction by means of a substance which itself undergoes no chemical change. The first known instance is the conversion of starch into sugar by treatment with acids, the latter being found unchanged, and undiminished in quantity in the final mixture.

Another case is the explosion of mixed hydrogen and oxygen in the presence of finely divided platinum.

Recent experiments on the speed of chemical reactions have thrown a little light into the darkness of this mysterious katalysis, and it is now believed that all such reactions would take place of themselves but with almost infinite slowness, and that the function of the katalyzer is to make the reaction rapid enough to be perceptible to our senses. Possibly, it overcomes some unknown resistance to the reaction, thus acting as a sort of chemical unguent. Now most of the chemical changes which are apparently wrought by light are of this sort. They take place, though slowly, in the dark. Every photographer knows this from experience. His bichromated paper becomes useless in a few days, his plates in a few months or years.

The function of light in photography, then, is simply that of an accelerator, a katalyzer, and it may be replaced by other katalyzers. Now there are few better katalyzers than the layer of finely divided silver which forms a photographic negative picture, and there are few substances more susceptible of katalytic action than peroxide of hydrogen, which, despite its excess of oxygen, and its resultant tendency to split up into oxygen and water, is entirely permanent under normal conditions.

This is the theory of the katatype. Its practice is as follows:

The negative is flowed with an ethereal solution of peroxide of hydrogen. The peroxide is instantly decomposed more or less completely wherever it comes in contact with the silver film, and the evaporation of the resulting water leaves on the plate an invisible picture in unaltered peroxide which is densest where the negative is least dense, and is therefore a positive. As peroxide of hydrogen is both an oxidizer and a deoxidizer and lends itself to many chemical reactions, the subsequent processes are of great variety. The simplest consists in transferring the picture by slight pressure to gelatine-coated paper which is flowed with ferrous sulphate, washed, and treated with gallic acid, the result being a dark-violet and very permanent picture—in fact, a picture in writing ink. Other tones may be produced by using various solutions in place of gallic acid. In another process the ferrous sulphate is replaced by a solution of manganese, the result being a picture in peroxide of manganese which may be toned in various ways. Or the invisible picture may be transferred from the negative to gum or gelatine pigment papers, *not* sensitized with bichromate, and developed in ferrous solutions.

The production of ferric salts in proportion to the density of peroxide makes the shadows insoluble and the lights are washed away with warm water in the usual way.

A similar process is employed for the production of gelatine plates for printing in lithographic ink.

The advantages claimed for the katatype are that it makes the photographer independent of the uncertainty of natural, and the inconvenience and expense of artificial light, and that it dispenses with all sensitized and therefore perishable papers.

The result is the same whether the plate is flowed in bright sunlight or in absolute darkness.

NAMING THE VESSELS OF THE NAVY.

BY LIEUT. ARTHUR BAINBRIDGE HOFF, U. S. N.

To the man-o'-war's man there is nothing about a ship so pregnant of meaning as her name. If the name is new, it is bright with hope; if old, proud with tradition. It looks as if we must soon return to our old service names, each one comprising in its less-than-a-dozen letters a bit of history fraught with courage, bravery, peril, fortitude, and right. The "Constitution," "Bonhomme Richard," "Hartford"—these mean a lot to the men that go to sea in the white ships with the long pennant.

Our law requiring us to give the names of States to ships of the first rate was a very wise law. When it was passed by Congress, the navy needed to be popularized, and since that time we have risen from nowhere on the list of sea powers to fifth in rank. But now of the names of States but five remain to be used, Utah, Delaware, North Carolina, South Carolina, and North Dakota. Consequently, the opportunity is now presented of reverting to the old names. Everybody seems to want them; and everybody knows them. In foreign navies the names of old ships are always perpetuated. In the British navy to-day we find some of the names of vessels that drove back the Armada. Think of it! And yet our own names are no whit less glorious. For our larger ships we could take the old frigate names, "Bonhomme Richard," "Constitution," "Constellation," "United States," "Essex." These bore the pennants of John Paul Jones, Hull, Truxtun, Decatur, Porter. They should be memorialized in the steel and steam navy of to-day. Why not? And just as well-known heroes flew the flag on board sloops and smaller craft. Now which is better—to keep our old names in the service, or keep on naming our cruisers and smaller craft after towns and cities? Why not name at least half of them after our old friends of 1776 and 1812? These names, for instance, should never be missing from our list: "Andrea Doria," "Alfred," "Ranger," "Raleigh," "Saratoga," "Alliance," "Enterprise," "Boston," "Hornet," "Wasp," "Peacock," "Niagara," "Eagle," "Ticonderoga." All of these and all the frigate names are the names of victors in sea fights. Then there are old honored names in the navy such as "President," "Hancock," "George Washington," "Congress," "Lexington," "Potomac," "John Adams," etc.

Names which stir up the most inspiring memories are those of vessels captured from the enemy or destroyed in open battle. These form an actual record of our past success.

Look at the big English ships with French names—the "Impérieuse," "Achille," "Pomone," "Barfleur," "Sans Pareil"—every one a Frenchman captured. And they even have our own "Essex" and "President" on their list; just as we still have on our list the "Alert," "Detroit" and "Boxer," taken from them. Now, what a glorious idea this is! Think of five battleships with the British names (frigates) "Serapis," "Guerriere," "Macedonian," "Java," "Conflance," and the French "Insurgente;" in addition to the lately acquired names in Montojo's and Cervera's squadrons. These should be applied to our larger ships. For our smaller ships we could be supplied from our long list of other captures. Those taken in hard-fought fight should come first, however. The chief of these are "Racehorse," "Drake," "Countess of Scarborough," "Savage," "General Monk," "Queen Charlotte," "Lady Prevost," "Epervier," "Cyane," "Levant," "Linnet," "Reindeer," "Penguin," "Nautilus," from the British; the "Berceau" from the French, and the "Daniel Webster" and "Lancefield" from the Japanese. Strange names, these last, for Japanese ships, but read about MacDougall in the "Wyoming" in 1863, and see what American sailors have done when boldly and skillfully led. Our list of captures is so large that we would never reach the end of it. From the British alone in equal combat we have caused the surrender of 5 frigates, 29 sloops and brigs, and 23 small craft, to say nothing of privateers—British, French, and Tripolitan. Of all our captures, there are at present on our navy list but five. "Detroit" (British flagship at Lake Erie), and the "Jason," "Frolic," "Boxer," and "Alert."

It is something to remember that ours is the oldest man-of-war flag now afloat. It was adopted in 1777. Next in age comes the man-of-war ensign of Spain (1785), then France (1794), Great Britain (1801), Portugal (1830), Italy (1848), and Germany (1871.)

Now this subject of ships' names does not end here. There is a curious custom in our own and the British service. Whenever one of us lost a ship to the other, the name of that ship was not lost but was promptly applied to another ship, even though the captor might have adopted the new name.

On our own list to-day we have "Vixen," "Eagle," "Rattlesnake," "Scorpion," "Essex," "Raleigh," "Chesapeake," "Ohio," "Somers"—every one of these has been taken from us by the British. Likewise the British have the "Hawke," "Alert," "Druid," "Magnet," "Jason," "Boxer," "Hunter," "Reindeer," "Avon," "Confiance," "Linnet," "Penguin," "Racehorse," "Caledonia"—every one of these we captured from the British. Some of our captures from the British, it will be noted, had been taken from the French, such as the "Guerriere," "Cyane," "Epervier," "Confiance," "Trépassey." The following list shows what captured names we are entitled to:

From British: "Edward" (7), "Racehorse" (12), "Mellish" (10), "Druid" (14), "Drake" (20), "Serapis" (50), "Countess of Scarborough" (22), "Atalanta" (16), "Trépassey" (14), "Savage" (16), "General Monk" (20), "Little Belt" (22), "Guerriere" (38), "Frolic" (22), "Macedonian" (38), "Java" (38), "Peacock" (20), "Boxer" (14), "Detroit" (19), "Queen Charlotte" (17), "Lady Prevost" (13), "Hunter" (10), "Little Belt" (3), "Chippewa" (1), "Epervier" (18), tender to "Tenedos" (1), "Reindeer" (19), "Avon" (18), "Confiance" (37), "Linnet" (16), "Chubb" (11), "Firsch" (11), 12 gunboats (17), "Penguin" (19), "Cyane" (34), "Levant" (21), "Nautilus" (14), a schooner (10), "Detroit" (6), "Caledonia" (2), "Duke of Gloucester" (14), "Eagle" (1), "Black Snake" (1), a schooner (14), tender to "Severn" (1), tender to "Cerberus" (1), "Hawke" (6), "Bolton" (12), "Fox" (28), a brig (14), a brig (4), "Alert" (20), "Simcoe" (12), "Highflyer" (6), "Julia" (2), "Growler" (2), "Mary" (2), "Drummond" (2), "Lady Gore" (2), "Picton" (14), "Magnet" (14).

From the French: "Insurgente" (40), "Berceau" (24), "Retaliation" (14).

From the Barbary States: "Tripoli" (14), a frigate (22), "Meshboha" (36), "Transfer" (16), "Estido" (22), "Mashouda."

From the Japanese: "Lancefield" (4), "Daniel Webster" (6).

From the Mexicans: A brig (12), "Libertad" (1), "Alerta" (1), a light squadron.

From Spain: "Reina Christina," "Castilla," "Marques del Douro," "Argos," "Cristobal Colon," "Pluton," "Elcano," "Reina Mercedes," "Don Antonio de Ulloa," "Don Juan de Austria," "General Lezo," "Infanta Maria Teresa," "Almirante Oquendo," "Jorge Juan," "Leyte," "Sandoval," "Alvarado," "Isla de Cuba," "Isla de Luzon," "Velasco," "Vizcaya," "Furor," "Callao."

It is but fair to our gallant adversaries to say that the British took 38 vessels from us, the French 1, the Tripolitans 1, and the Mexicans 1, 16 of the British vessels being in fights and 22 captured by superior forces.

Now a curious thing about our old adversaries and ourselves is the number of vessels of the same name borne on our respective navy lists. Truly blood is thicker than water. We and the British have the following ships' names in common: "Cæsar," "Hannibal," "Essex," "Cumberland," "Lancaster," "Amphitrite," "Fox," "Porpoise," "Jason," "Rattlesnake," "Pike," "Boxer," "Petrel," "Ranger," "Shark," "Vixen," "Alert," "Dolphin," "Vesuvius," "Hawke," "Adder," "Enterprise," "Buffalo," "Supply," "Terror," "Raleigh," "Intrepid," "Arethusa." But it is a strange mixture. We give our colliers the names of their battleships, and the rest are a hopeless mix-up. England is very careful of tradition in naming her ships. She has the "County" class, and the "Admiral" class, and other classes. She gives her battleships the names of her great admirals, while our captains of the sea must be contented with torpedo-boat destroyers. The "Farragut" is 273 tons, the "Paul Jones" 420.

But, in conclusion, there is still a word to be said about ships' names that perhaps is the most soul-satisfying of all, and that is the custom of having in a ship prominently displayed on turret, bulkhead, or beam, the *names* that belong to *that name.*

Suppose we had a big battleship called the "Constitution." We round under her stern in our boat in coming alongside, and the very name thrills one. But on stepping over the gangway, there on her turret in letters of gold are: "1812, H. M. S. 'Guerriere;' 1812, H. M. S. 'Java;' 1814, H. M. S. 'Picton;' 1815, H. M. S. 'Levant' and H. M. S. 'Cyane.'" Everyone knows what that means, and those who do not can ask. Nearly all foreign ships have such names on them, or if taking part in some bombardment, boat action, or similar expedition, blazon the names on board for all to see, and to make Jack proud of the ribbon on his cap. Of the names at present on our navy list, these are ships entitled to such honors: "Raleigh," 1777, "Druid" (14); "Ranger," 1778, "Drake" (20), "Jason" (20); "Alliance," 1781, "Atalanta" (10), and "Trépassey" (14); "Constellation," 1799, "Insurgente" (40), 1800, "Vengeance" (50); "Enterprise," 1800, French privateers, "Seine" (4), "Citoyenne" (6), "Agile" (10), "Flambeau" (12); 1801, "Tripoli" (14), 1813, "Boxer" (14); "Boston," 1800, "Berceau" (24); "Wasp," 1812, "Frolic" (22), "Reindeer" (19), "Avon" (18); "Hornet," 1812, "Peacock" (20), 1815, "Penguin" (19); "Lawrence," 1813, Lake Erie; "Scorpion," 1813, Lake Erie; "Somers," 1813, Lake Erie; "Rattlesnake," 1814, "Mars" (14); "Eagle," 1814, Lake Champlain; "Preble," 1814, Lake Champlain; "Porpoise," 1827, "Comet" (10); "Grampus," 1822, "Pandrita" (14), "Palmira" (9); "Wyoming," 1863, Shimonoseki, 1867, Formosa; "Potomac," 1832, Qualla Battoo; "Columbia," 1838, Qualla Battoo; "Petrel," 1846, Peruca; "Hartford," 1867, Formosa; "Colorado," 1870, Corean Forts; "Mohican," 1870, Forward; "Detroit," 1894, Rio de Janeiro; "Portsmouth," 1857, Barrier Forts.

What an inspiration to the new recruit is the contemplation of such names! There is so much in a name, especially a ship's name, and more than all in such ships' names as belong to us and our naval history.

SCIENCE NOTES.

The name Corosos, or Corozos, is apparently applied to several fruits, although in this country usually applied in commerce to the palm seed yielding vegetable ivory, i. e., *Phytelephas macrocarpa.* The fruit of *Elæis melanocarpa*, Gaertn., is called on the Pacific seaboard *Corozo colorado*, and on the Atlantic side of South America the fruit of *Attalea Cohune*, Mait., is known as *Corozo gallinazo.*—Journ. d'Agricult. Trop.

Capt. Lamb, I.M.S., has made a series of experiments upon the action of the venoms of the cobra and of Russell's viper (*Daboia Russellii*) upon the red-blood corpuscles and upon the blood plasma (Scientific Memoirs of the Government of India, New Series, No. 4). Both these venoms are shown to have a marked hæmolytic action, both *in vivo* and *in vitro.* Cobra venom never induces intra-vascular clotting; in fact, it rather diminishes blood coagulability, while Daboia venom causes extensive intra-vascular clotting. *In vitro* cobra venom prevents the clotting of citrated blood or plasma which ensues on the addition of a soluble calcium salt; Daboia venom, on the other hand, increases the tendency of citrated blood and plasma to coagulate. In conclusion, Capt. Lamb considers that his experiments do not support Martin's hypotheses that all snake venoms contain at least two toxic proteids, one being a neurotropic and the other a hæmotropic poison, and that the action on blood coagulability is due to a setting free of nucleo-proteids.—Nature.

In a paper recently read before the Académie des Sciences, M. Yves Delage states that he has made a series of experiments upon artificial fecundation of eggs of some of the inferior animals, particularly marine specimens, and has been successful in certain cases. In the case of some species he was able to replace the natural fecundation by the action of carbonic acid gas. Non-fecundated eggs which were treated with sea water charged with the gas were observed to develop normally. It is to be remarked, however, that all the eggs are not adapted to develop by this process. To do so it is necessary that the eggs should be in the act of performing a certain physiological function which is required for all eggs to render them capable of fecundation. This action consists in the emission of "polar globules." The eggs which have already completed this function are no longer sensitive to the action of the carbonic acid. This latter phenomenon he observed in the case of sea-urchins. M. Delage states that at present he is able to sensitize these eggs and also to render them capable of being developed by the action of carbonic acid. This he accomplishes by shaking them up in a closed vessel and heating them to 30 degrees.