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MORE ENGINEERS NEEDED FOR THE NAVY.

The annual report of Geo. W. Melville, Engineer-in-Chief, Chief of Bureau of Steam Engineering, shows that the repairs of machinery and steam vessels during the past year have cost something over $600,000. The lack of competent engineers to man the rapidly increasing number of war vessels has become a serious matter. On the active list there are only 180 commissioned officers in the engineer corps, namely, 70 chief engineers, 66 passed assistants, and 44 assistants.

The chief says: "Unless something is soon done, our navy, now practically an engineering one, will be crippled for want of engineers.

"This question of the sufficiency of engineers in the service is one of paramount importance, and no other, if left in abeyance, will so vitally affect the efficiency of the navy as a fighting organization. It must be remembered that the efficiency of the modern war ship, either as a fighting machine or as a commerce destroyer, depends wholly and absolutely upon her machinery, and the efficiency of this machinery upon the skill of her engineers, and upon the diligence exercised by them in its care and management. Be her armor and armament the most powerful and her commander the most capable and intrepid, if her machinery fails, she is helpless, and no amount of seamanship and gunnery will avail against the enemy.

"Were the navy a mercantile concern, the present state of affairs would not last beyond the time necessary to change it, for men with capital invested in machinery see to it that there is a force sufficient to keep it in proper maintenance; and surely if business people find such a course economical, the government cannot do better than follow their example. The value of the naval machinery now owned by the government and in process of construction is about $24,000,000, and it has now come to the point where Congress must decide whether it is more economical to properly care for this machinery and keep it always in an efficient condition or to let it run as long as it will and then replace it, taking meanwhile the risk of having it fail when most needed. As an illustration of the increased work thrown on the members of the engineer corps by the acquisition of the new navy, I can state that the New York has added 17 per cent to the horse power of the machinery of vessels in commission; the Columbia will add 17·3 per cent more; and when the ships now authorized and building are finished, the horse power of the propelling machinery of the navy will have increased to nearly *two and a half times its present amount*—and yet we are asked to run it with the same number of engineer officers that we now have.

"The officers of the engineer corps at sea on the new vessels have altogether too much work to do now, and it is merely a question of time before the strain will tell. The result of this hard work is being seriously felt: retirements are increasing, and the government thus subjected to an expense greater than would be involved in now granting a fair increase of numbers, while some of those who manage to complete a cruise in one of the high-powered ships only await a favorable opportunity to resign. Many of our young officers who have resigned to accept lucrative and responsible positions would have preferred to remain in the service if they could have seen any chance of advancement in it."

THE COLUMBIA, THE NEW COMMERCE DESTROYER.

The new American navy has become a popular subject with the people at large. The records of the trial trips are given place in the papers, and much congratulation is expressed over the results obtained. Yet the fact is apt to be forgotten that a few hours' run of a new ship under the most favorable auspices does not tell what she will do in the service. To-day no satisfactory method of keeping an iron ship's bottom free from barnacles and seaweed is known, and the slightest deposit reduces speed. The duration of the engines and boilers under service conditions is problematical. The warship certainly seems to deteriorate or to develop weakness in her boilers or machinery in very short periods.

From the old sailing vessel, through auxiliary steamships, the development has at last brought us to triple screw ships without sail power enough to be of more than the slightest service. It is perhaps true, as ex-Secretary Tracy says, that we have in the Columbia, New York and Olympia three ships unapproachable in good qualities. But admitting this, the question has to be answered of how long these ships will retain their qualities. Will they hold their present efficiency for years, or even months? Time and repeated speed trials can alone show this.

An attempt was made on Thursday, November 16, to subject the new cruiser Columbia to an official trial over a 44 knot course. Buoys were placed along the course, vessels were anchored near each buoy, and the ship started on her trial run. On the trip from Philadelphia to Boston, she had already shown very high speed. On attempting the trial, however, the sea was so high that the buoys were displaced, and the attendant vessels could not lie at anchor, so the trial was abandoned. Sufficient, however, was done to show that the vessel does possess very high powers, reaching a rate of speed, for a short run, from 28 to 29 statute miles an hour. This speed of course she could not long maintain, but for a ship of her size to reach it was very extraordinary. Not only was her rate of travel very high, but the Columbia is designed to have a very long radius of action, being able to steam around the world without recoaling.

While the above sounds very satisfactory, and the ship is apparently a triumph of American construction, experience has shown that it is not safe to judge a war vessel from these trials. A vessel designed for use as a warship, when put in charge of the navy and kept in such service, never is able to hold her original record. The English government has all its ships of war rated, each one at its specific speed, but it has time and again been shown that the rating is far too high, and the ships, owing to deterioration of the propelling apparatus or to marine growth on their bottoms, always show a greatly reduced speed.

The Columbia is built for a commerce destroyer. She may be able to run away from any heavy fighting ship. In war her competitors would be the fastest ships of the British navy. Among these, at present, are the reserve ships Campania and Lucania, of the Cunard line, ships which day in and day out maintain speed approximating to the highest obtainable by the Columbia on her trial trip, ships which from the conditions of their service are always kept in the best possible condition for instant service. Each regular trip consists of a run of some 3,000 miles, in which runs a gain of five or ten minutes over the record is eagerly striven for. It is not improbable that the Columbia, driven under forced draught, straining every fiber under the action of the machinery, stripped and in the most perfect condition for a few hours' run with selected coal, will earn for her builders a premium of $400,000. After all this she will not have been properly tried. She should be manned with a crew from the American navy, she should be coaled under ordinary conditions of quality of fuel, and her trial course should be the same as that of the Cunard ships or of the German or American line vessels—the course of about 3,000 nautical miles across the ocean. Then we could establish her true rating, and the trial would show whether she could compete in war with the Lucania and Campania, with the Furst Bismarck or the Paris. In the present system of trial trips everything is subordinated to making the highest possible speed over the short course of forty to fifty miles.

While her trial has been in progress or preparation, Mr. Charles H. Cramp, of Philadelphia, who represents the firm which built her, presented before the Society of Naval Architects and Marine Engineers of this city a paper on the "Evolution of the Atlantic Greyhound." In about a year the two ships of the American line built at the Cramp yard will be in commission. In them he proposes to go back to the old American idea of high initial stability and make ships which will stand on their own bottoms without the use of 1,000 tons of ballast. These ships will be in continual service and will be driven at full speed under the regular conditions of their work. In such vessels as these enrolled as a naval reserve would seem to be the greatest hope of our navy for the really efficient commerce destroyer.

A Singular Balloon Accident.

A Rome correspondent of the London *Daily Graphic* says: Captain Charbonnet and his wife recently met with an extraordinary balloon accident in the Alps. Captain Charbonnet was a well known Italian aeronaut. He was recently married in Turin, and, in accordance with a previous decision, the couple set out immediately in a newly constructed balloon—the wedding present of the bridegroom to his bride. Their intention was to spend their honeymoon in making a series of aerial trips across the Alps. They were accompanied by a male friend named Giuseppe Ponta. The first day's trip proved successful. On the following day, however, when near the Cairainella Peaks, the balloon was caught in a hurricane, dashed violently against a glacier, and broken up. Strangely enough, the occupants escaped this mishap with trifling injuries. The balloon, of course, was useless. The unfortunate trio remained on the snow and ice until the following morning, when a descent of the mountain was attempted. It was during this descent that Charbonnet lost his life, disappearing suddenly in a crevasse. His unfortunate wife and Signor Ponta, who were forced to spend the rest of the day and the following night on the mountain, suffered terribly from the cold. Signor Ponta fell and sustained serious injuries, Signora Charbonnet having thus to make her way alone. She managed at length to reach a mountaineer's hut. Here, acting upon her instructions, a party of men discovered Ponta and brought him safely back. The remains of Captain Charbonnet were recovered on the following day. Two days later Signora Charbonnet and Signor Ponta were sufficiently recovered to be removed to Turin.

Natural History Notes.

Discovery of an Egg of the Æpyornis.—A large specimen of the egg of the fabled "roc" of the "Arabian Nights," or *Æpyornis*, as the extinct gigantic bird of Madagascar is called, has recently been secured by Mr. J. Proctor, of Tamatave and London. It was discovered by some natives about twenty miles to the southward of St. Augustine's Bay, on the southwest coast of Madagascar. It was floating on the calm sea, within twenty yards of the beach, and is supposed to have been washed away with the foreshore, which consists of sandhills, after a hurricane in the early part of the year. The child-like longshoremen of the antipodes, thinking that the egg might have a value, showed the unusual piece of flotsam about, with a view to the sale of it, and it thus came into the hands of Mr. Proctor, who has brought the curiosity to London. The egg, which is whity-brown in color and unbroken, is a fine specimen, 33½ inches by 28 inches, and an even higher value is placed upon it than upon the egg of the great auk, which lived within the memory of man. The Brobdignagian proportions of the egg are better demonstrated by comparison with the eggs of the ostrich and crocodile. An ostrich's egg is about 17 inches by 15 inches, and the contents of six such are only equal to one egg of the *Æpyornis.* The measurements of the egg of the crocodile are normally 9 inches by 6½ inches. It would require the contents of 16½ emu's eggs to equal the contents of this great egg, or 148 eggs of the homely fowl, or 30,000 of the humming bird. The last egg of the kind disposed of in London sold for £100, though cracked.

A Plant with Anomalous Position of Flowers.—In the *Journal de Botanique* for July 1 and 16, Mr. Hua describes, as a new genus, a plant from west tropical Africa, in which the flowers are borne along the midrib on the back of the leaf. This anomalous position of the flowers is only of rare occurrence, appearing in a few almost or quite monotypic genera, such as the Japanese *Helwingia* of the Araliaceæ, the saxifragaceous *Phyllonoma* of the New World, and *Polycardia* (Celastrineæ) from Madagascar. The common lime recalls, in a small degree, the same phenomenon, the stalk of the inflorescence adhering to the lower part of the bract and appearing to spring from the middle of that organ. Tropical West Africa boasted already two genera with epiphyllous flowers, both belonging to the family Bixineæ, and *Mocquerysia*, the new one established by M. Hua (named after its discoverer, M. Mocquerys) resembles these in some points, and is placed by its author in the same natural order.

Fishes at High Temperatures.—Dr. Lawrence Hamilton has recently forwarded to *Natural Science* some interesting statistics that he has collected in reference to the existence of fishes in water of a high temperature. Some of the cases are very striking. Spallanzani, it appears, observed river carp living at a temperature of 106° F., and exhibiting no signs of uneasiness, though at 109° they began to struggle, and died at 116° F. Dr. John Davy (1835) showed that the bonito had a temperature of 99°, while the water of the Mediterranean, in which it was, had only a temperature of 80°. Saussure stated that he found eels in the hot springs of Aise, in Savoy, at a temperature of 113° F. In 1882, Dr. Davy found that water at 85° F. killed trout by convulsions. A trout and a minnow were put in water at 70° at night, which by the next morning had sunk to 67°, when the trout was dead, though the minnow had not suffered. A salmon parr at 80° became convulsed and torpid, dying at 84°. Several fishes were deposited in water at 53° F.; the temperature of the water was gradually raised, and none showed signs of failing vitality till the thermometer rose to 82°, when the perch became prostrated, roach succumbed at 82½°, salmon at 83°, minnow at 85°, gudgeon at 85½°, dace at 86°, tench at 88°, and carp at 91°. Brandy restored all the fishes except the dace, which died.

In India fishes at noon day in their natural water remain in health at 92°; at 4 P. M., 86°; and at 6 P. M., 82°. Gunther states that cyprinodonts live in briny springs even at a temperature of 91° F.

Sir Emerson Tennent collected the following observations, which seem to require further proof or verification:

In the hot springs of Ceylon, living carp, *Nuria thermoicus*, at 114° F.; members of the perch family, the *Apogon thermalis*, and the *Ambassis thermalis*, in water at 115° F.; a roach, *Leuciscus thermalis*, at 112° F.

In a hot spring at Pooree (in the province of Bengal), with the thermometer in the water standing at 112° F., carnivorous fishes have been discovered, which would indicate that these must have found and fed on living prey at the same high temperature. Further accounts, moreover, declare that in hot springs in Barbary, in North Africa, living fishes have been taken in water at 172°, while in Manila (one of the Philippine Islands) in water marking 187° F. While traveling in South America, Humboldt and Koupland stated that they saw fishes thrown up alive from a volcano in water at 210° F., but this is, of course, an absurdity which nowadays, it is to be hoped, no one will believe.

Rudiments of a Pouch in Placentals.—If ordinary placental mammals have evolved from pouched animals like the modern marsupials, rudiments of the pouch ought certainly to be recognizable in some of them. Dr. H. Klaatsch has just made the interesting announcement that such rudiments can actually be observed in most placentals. Something of the kind has already been found in the lemurs, and one author has supposed that rudiments of the pouch can also be detected in the sheep. The detailed account of Dr. Klaatsch's extension of the evidence will be awaited with interest.

Color Assimilation among Fishes.—We already know a good deal about this, says Mr. James Hornell, in *Natural Science*, especially among the flat fishes; so the following instances but go to swell an already long list. Still, these are so striking as to be worthy of permanent record.

Two tanks were used for experiment, one with dark background and bottom, well shadowed; the other bright, with a white mottled sand bottom. Several of the marine stickleback (*Gasterosteus spinachia*) were placed in each. To sum up the result briefly, those in the dark shadowed tank remained practically unchanged in color, but those in the light colored tank had in greater or less degree lost their brightness and intensity of coloring. The beautiful gold bronze luster so characteristic of these sticklebacks was lost, and the backs were mottled black and white, contrasting strangely with the nearly unbroken yellowish black of the dorsal surface of their friends in the dark tank.

In the dark tank had also been placed a number of wrasses (Labridæ), and these showed fading all round, most marked in the bright greens and scarlets. As these colors are usually in combination with brownish marking, the fading of the bright hues meant a close approximation to the brown appearance of the bare conglomerate forming the rockwork of the tank. One fish especially beautiful at first (of a most brilliant scarlet and brown) faded to a dirty combination of pale olive green and brown, scarcely recognizable had the fish not been marked in a distinctive manner at the beginning of the experiment. The whole of these color changes were effected within the remarkably short period of a week.

It may be that these instances of color assimilation carry the key to the problem of color variation or rather mimicry in the prawn *Hippolyte* (*Virbius*) *varians.*

Plaice (*Pleuronectes platessa*) have also shown rapidity of color change much more marked than I was prepared for. Some that were placed in a large shallow tidal pond where the color of the bottom varies considerably and where a portion is often in deep shadow, show change from a uniform gray to a well marked and intensely dark blotched appearance within a few seconds. Indeed, it is quite chameleon-like, so quickly is the transformation effected. In ordinary tanks, where the light and color of the sand are stable, the plaice soon take the exact coloring requisite, and retain it without alteration so long as they remain in the particular tank.

The Sense of Smell in Fishes.—It is well known that the sense of smell in fishes is very keen, and that all use it more or less in feeding, whether or not sight aids them in the process. Some further experiments on the subject have been made by Mr. Gregg Wilson in the Plymouth Marine Biological Association, and the following observations from his recent report to the British Association will be read with interest:

"So far as I could determine, fish that are not *very hungry* habitually smell food before taking it. The pollack seems usually to be ready for a meal, and on almost all occasions when anything eatable is thrown into the tank in which it is swimming it rushes toward it and bolts it. It does not hesitate to take stale food or food that has been steeped in strong smelling fluids; and time after time I have been amused to see its too-late repentance, after it had swallowed clams that had been saturated with alcohol, chloroform, turpentine, etc. It is only when it is satiated with fresh food or disgusted with what is nauseous that it takes the precaution to smell before eating. On the other hand, various fish that are equally keen-sighted, and habitually recognize their food by the use of their eyes, are more prudent. The whiting (*Gadus merlangus*), for instance, appears to pay much more attention to smell, and, as a rule, turns about and withdraws on approaching within a few inches of high-smelling objects that the pollack would take without hesitation. Even whiting, however, cease to be delicate if they are very hungry, and if other fish are present to compete for the food that is thrown to them. In such circumstances bait that is very distasteful may be taken by even the most cautious of sight feeders; and likewise, in such circumstances, a quite smell-less artificial bait may be successfully employed. Where large shoals of fish are, there are likely to be many that are very hungry, and the consequent keen competition will lead to hasty feeding by sight alone; and hence it is probably that lead baits are successfully employed in cod fishing in the Moray Firth and off the Northern Islands, while they are of no avail among the scanty fish further south.

"It may be said that in these cases the fish actually *search* for their food by sight alone, and merely test the quality of what they have found by smelling it; and Bateson quite recognized this. But more is possible, *habitual sight-feeders can be induced to hunt by smell alone.* The pollack, which is such a pronounced sight-feeder that it will take a hook baited with a white feather or a little bit of flannel and trolled along the surface, is yet able, when blinded, to get his food with great ease. Several blind specimens in the Plymouth tanks were carefully watched by me; and I had no difficulty in deciding that it was by smell alone that they found their food. Their conduct was exactly such as was seen in the smell-feeders, to which I shall presently refer.

"Again, the cod (*Gadus morrhua*), which Bateson puts among the sight feeders, is generally believed—and with good reason, I think—to feed more by night than by day; which suggests that it, too, not only tests its food, but actually hunts by smell.

"Lastly, in this connection, I would state the results of my experiments. I worked with a number of fish, and always with the same success, but I shall here refer only to one case—that of the dabs (*Pleuronectes limanda*). That they were sight-feeders was evidenced by their behavior when I lowered a closed tube full of water, and with a worm in the middle of it, into the tank; time after time they bumped their noses against the glass at the very spot where the worm was situated. That they could also recognize the smell of food, apart from seeing it, was demonstrated in various ways.

"First, if instead of a closed tube, as in the last mentioned experiment, one open at the bottom was used, after a short interval the nosing at the part where the worm was seen ceased, and *the lower end of the tube*, from which, doubtless, worm juice was diffusing, was vigorously nosed. If, again, instead of putting worms into a tube, I placed a number of them in a closed wooden box with minute apertures to let water pass in and out, there was a similar excitement produced, and the dabs hunted eagerly in every direction. When water in which many worms had lain for some time was simply poured into the tank through a tube that had been in position for several days, and by a person who was out of sight of the dabs, the results were most marked. In a few seconds, hunting began, and in their excitement the dabs frequently leaped out of the water, apparently at air bubbles, and, on one occasion, one even cleared the side of the tank, which was about two inches above the water, and fell on to the floor of the aquarium. Yet there was nothing visible to stimulate this quest."

Peroxide of Hydrogen as a Disinfectant.

The disinfecting properties of peroxide of hydrogen have long been known; but considerable additions have recently been made to our more exact information as to its bactericidal action. Its hygienic importance, especially in regard to its action upon bacteria in water, has been shown by the interesting experiments of Van Tromp and Altehoefer, to which reference was made in a recent number of *Nature.* According to the former, an addition of peroxide of hydrogen in the proportion of 1 part in 10,000 parts of the water, when shaken up and allowed to stand for 24 hours, is usually sufficient to sterilize a water. Altehoefer, however, found that, to insure sterility, it was advisable to use larger quantities—viz., 1 part in 1,000 parts of the water. Experiments made with waters purposely infected with cholera and typhoid bacilli, respectively, showed that in both cases these organisms were destroyed after 24 hours by this proportion of peroxide of hydrogen. Altehoefer, moreover, specially mentions that he found this addition in no way interfered with the dietetic value of the water; and he recommends its application for household purposes as a protective measure during any epidemics of typhoid fever and cholera. Traugott also testifies to the innocuous character of this material, even when swallowed in large doses. Care must, however, be taken that it is as pure as possible; moreover, it is important that the sample should be freshly prepared, as its strength and consequently bactericidal action is reduced when preserved for some time.

How Many Bees Make a Pound?

This question is answered in a recent number of the *American Apiculturist.* Careful weighing shows that an ordinary bee, not loaded, weighs the one five-thousandth part of a pound, so that it takes five thousand bees, not loaded, to make a pound. But the loaded bee, when he comes in fresh from the fields and flowers loaded with honey or bee bread, weighs nearly three times more, that is to say, he carries nearly twice his own weight. Of loaded bees there are only about 1,800 in the pound.

An ordinary hive of bees contains from four to five pounds of bees, or between twenty thousand and twenty-five thousand individuals; but some swarms have double this weight and number of bees.