TORPEDO TARGET PRACTICE AT KIEL.

Among the weapons which are called upon to play an important part in modern warfare, the torpedo stands in the foremost rank of interest, and yet very little is known of its peculiarities, especially of those of the German torpedo. Its greatest danger does not lie in the fact that it is an engine of destruction, but in the power to direct it with fatal certainty. This is accomplished by treating the torpedo, to a certain extent, as if it were a living creature, its character and peculiarities being observed, and the results of these observations being recorded in a list of particulars, to which those in command refer when firing. Especial attention is paid to target shooting, and keeping a careful record of the results thus obtained; and besides this, the torpedoes just from the works are tested as to their mechanical correctness, with a view to regulating them.

In our article of to-day we treat of a very important factor in the life of the torpedo—the practice ground, with all its interesting details. The celebrated firm of "Schwarzkopf," which, as is well known, supplies half the world with torpedoes, has two practice grounds of this kind, one in the harbor of Kiel and the other near Venice. A third one, which was built on the same model at Yokohama, now belongs to the Japanese government.

A practice ground of this class consists of two parts connected by a railroad track, viz., the machine house, which contains all the machinery necessary for the regulation of the torpedoes, and the shooting place proper. To this leads a bridge which extends sufficiently far over the water to give the torpedo and the pinnace employed in the operation the required depth. At the head of the bridge is the trestle, the under part of which is arranged for the reception of the torpedo tube, while above, on the platform, is a little house for the engineers. (See Fig. 1.)

We will now follow the very interesting details of firing, which is by no means as simple as the firing of guns. Let us begin by placing the target, which consists of a float about 25 meters long and 1½ meters wide, carrying a breastwork on the side toward the practice waters. (See Fig. 2.) The supports of the breastwork are 1 meter apart, and thus serve to measure the course of the torpedo in relation to the center of the target, which is marked by a stake carrying one of the usual round disks. On the float there is also a kind of sentry box for the protection of the target man or guard.

The preparation for firing consists, first, as we have said, in placing the target. The pinnace tows it about 400 meters into the bay, the correct position being obtained from the bridge by means of sextants, and then it is secured in place by four anchors carried out from the four corners by a boat. When the float is firm, the torpedo is brought out of the shop, along the bridge, on a truck, to the crane, Fig. 3, by which it is swung

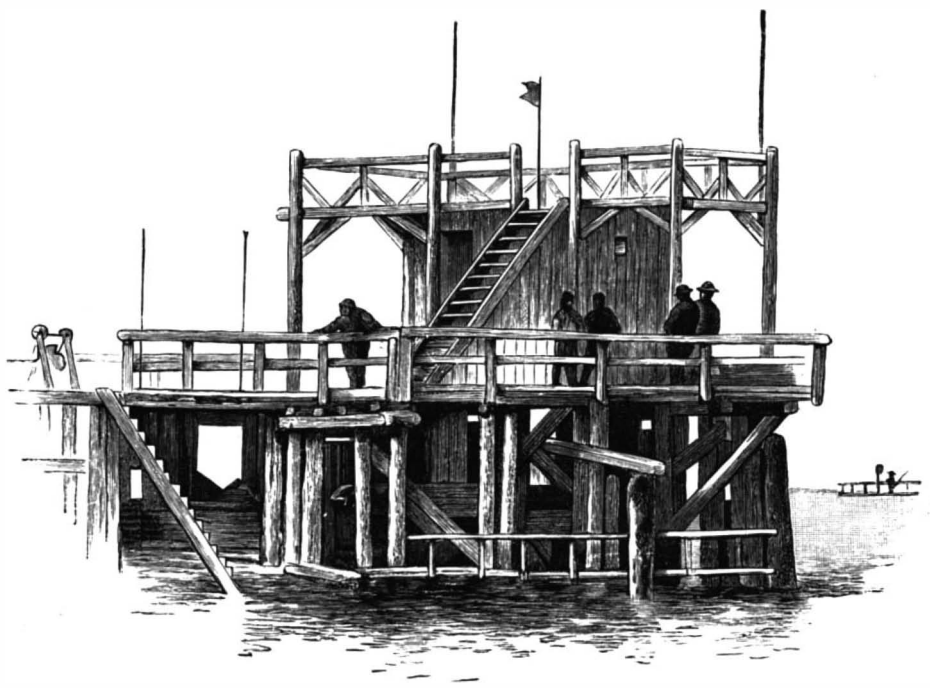

Fig. 1.—THE COMMANDER'S SHED.

out on to the loading frame. Here it is filled with compressed air. This operation, which can be detected at a distance by a peculiar singing sound, consists of forcing compressed air—by means of a pump located in the shed—into the torpedo through a small copper tube, which can be seen in our illustration, Fig. 3. The supply of air is regulated by a man at the manometer, while it is cut off by another man who stands by the torpedo. Then it is launched, pushed in front of the firing tube, and is finally raised and pushed into the tube, which is closed and lowered to a depth of 2 meters. (See Fig. 4.) The torpedo is now ready for firing. The torpedo is propelled in part by the impulse given to it when fired from its gun and in part by the compressed air with which it is charged, which acts on the propeller at the rear of the torpedo.

The red flag, which means "clear the way," is now raised above the commander's shed on the bridge, and the man on the target and those on the pinnace, which is lying to the starboard of the target, answer with their flags. As soon as the signal has been returned, the commands "ready," and then "go" follow, and the torpedo is fired. With a roar which reminds us of the shrill, hoarse cry of a beast of prey, the monster shoots out of the tube (see Fig. 5), and its course is marked by a strange wake of foaming, seething water, between the cross waves of which great bubbles of air come to the surface. The man on the target has calculated the probable course of the projectile from the wake, and he keeps his eyes fixed in the depths, until suddenly he sees it rush by; then he pulls down the flag, and a hundred meters beyond the target the torpedo springs out of the water like a sea monster. The moment it passed the target the pinnace started in after it under full head of steam, so as to catch it when it came to the surface. For this the greatest foresight is necessary, as the torpedo has to be handled carefully. The pinnace approaches it slowly, fastens a line to its head, and then starts off to the target. (See Fig. 6.) Here the net is taken on board, which has been used in a manner presently to be described. The target man determines the horizontal distance of the course of the projectile from the center of the target by means of the supports referred to above; but to find its depth, several nets are secured below the target, the meshes of which are so arranged that the torpedo cannot pass through without breaking one of them. After the projectile has passed the target, the man stationed there raises the net (see Fig. 7) which has been struck and hands it over to the pinnace, which now returns with the net and the torpedo to the starting point, which must also be approached with great care, so that by skillful management the torpedo may receive the proper impulse to deliver it to the hands of the man waiting to receive it. After being brought back in this way from its sea voyage the torpedo is raised and prepared for another trial, while the net is given to the engineers, who spread it out and measure the broken meshes. Then the record is made and the operation is completed.

It will be seen that this is a much more complicated operation than the firing of guns, and consequently only about five shots can be fired in an hour. Of course, a trained body of men is required for manipu-

Fig. 2.—THE FLOATING TARGET.

lating the different apparatus. The target man, in particular, must have a great deal of practice in observing the course of the torpedo. Before he has become accustomed to his work he cannot see the projectile as it moves rapidly through the water. This post is, besides, a dangerous one, for it has repeatedly happened that the torpedo has made an unexpected jump over the float and wounded the guard, but fortunately none of these accidents has proved fatal. Sometimes the torpedo does not come up in the prescribed spot, but runs on until its air is exhausted, in which case it is likely to be lost. Of course great pains are taken to recover it, for no small amount of capital is at stake. A torpedo costs from $2,400 to $2,800.

Torpedoes are not now fired exclusively under water, as heretofore, but also above water, from a deck, by means of compressed air or powder. —*Ueber Land und Meer.*

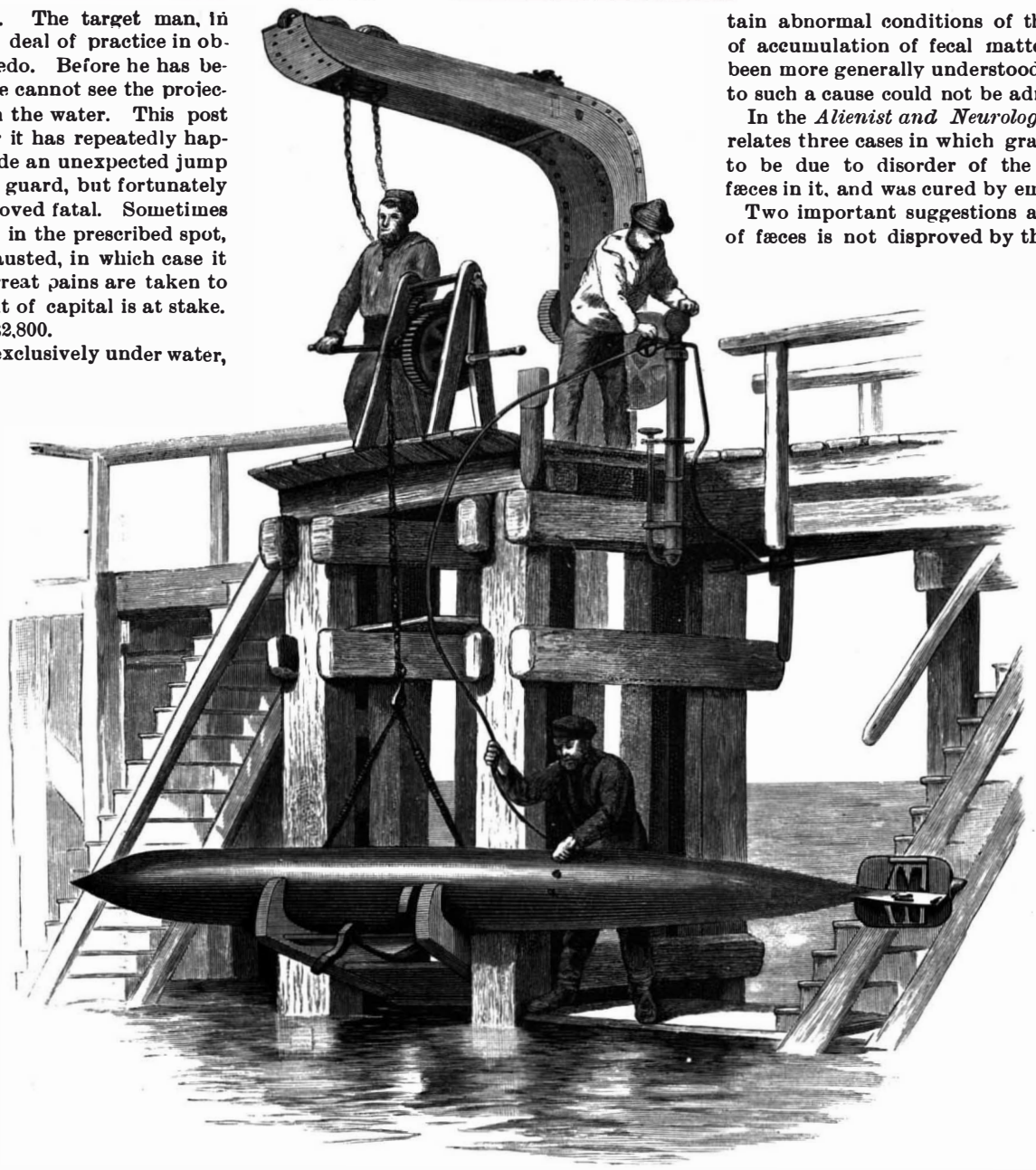

Fig. 3.—FILLING THE TORPEDO.

Insanity Proceeding from the Colon.

Few general practitioners will agree with the eye specialist who stated that he had rejected as mere superstition the prevalent views concerning the importance of securing thorough action of the bowels in sickness. While it is true that some persons are much more affected by the occurrence of constipation than others, it is also true that the health of a large part of the human race is greatly influenced by the state of the intestinal functions. As some one has expressed it, one of the best preparations for active life is a good set of bowels. Probably the worst indictment that can be brought against our modern system of education is that it cultivates in the boys and girls a habit of intestinal sluggishness, by compelling them to hurry off in the morning to school, and to repress the desire for stool; by producing feebleness of muscle and passive congestion of pelvic organs as the result of long sitting and want of physical exercise. This habit is, in men, sometimes corrected by the out-door labors of after life; but in women, especially those of the wealthier classes, it is confirmed by confinement indoors and want of muscular exercise. The important part which intestinal inactivity (glandular as well as muscular) bears in the causation of sickness is witnessed by the fact that purgatives are among the remedies most frequently taken. Probably no other class of drugs is so often called for.

It will be readily admitted that many of the milder affections of the nervous system may be caused by excessive and long-continued accumulation of fæces in the large intestine, or rather by the abnormal state of the system which permits or arises from such an accumulation. Since the discovery of the nature and poisonous influences of ptomaines, and kindred bodies, and of their formation in certain abnormal conditions of the digestive tract, the dangers of accumulation of fecal matters in the large intestine have been more generally understood. That insanity could be due to such a cause could not be admitted without direct proof.

In the *Alienist and Neurologist*, January, 1890, Dr. Moyer relates three cases in which grave mental disturbance seemed to be due to disorder of the colon, with accumulation of fæces in it, and was cured by emptying of this organ.

Two important suggestions are made. That accumulation of fæces is not disproved by the occurrence of free passages, and that treatment should be by large, repeated, high injections, purgatives doing only harm.—*Medical Record.*

[We are cognizant of a case of paresis, the early indications of which could be traced back for more than twenty-five years prior to the death of the sufferer. During the whole of this period he was a victim to constipation, which became more and more obdurate, and the paresis correspondently progressed. — ED. S. A.]

Fig. 4.—PLACING THE TORPEDO.

Fig. 6.—TAKING THE TORPEDO IN TOW.

Fig. 7.—RAISING THE NET.

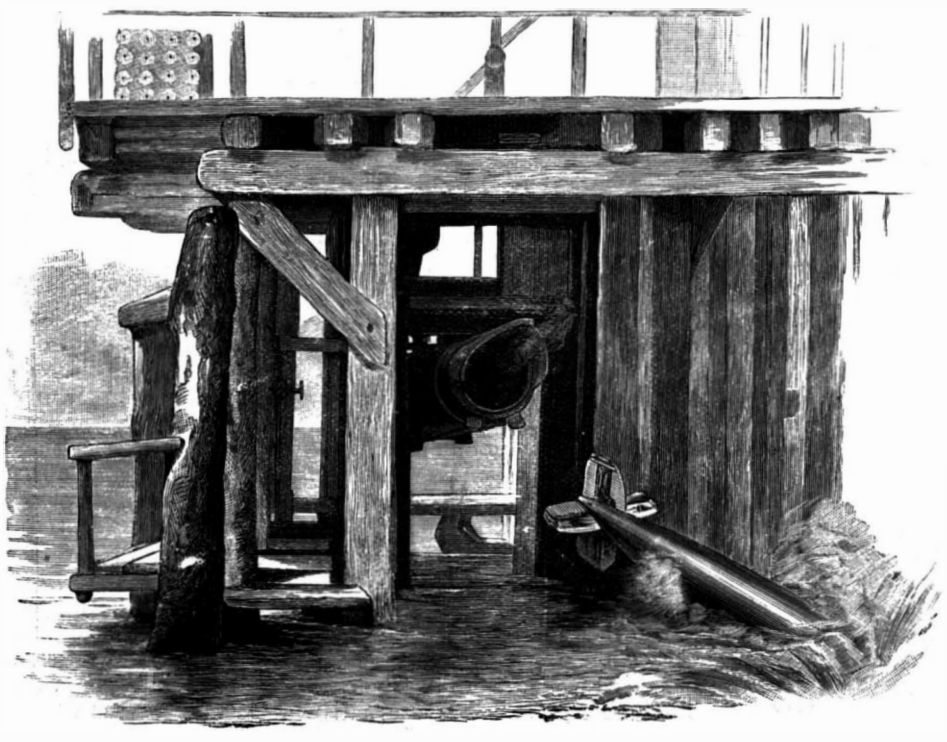

Fig. 5.—FIRING THE TORPEDO.

How to Reach and Enjoy Old Age.

It is no simple matter to state in terms at all precise what forces are directly connected with the production of hale and happy old age. More certainly is involved in the process than mere strength of constitution. Healthy surroundings, contentment, and active, temperate, and regular habits are most valuable aids. Hard work, so long at least as it is not carried beyond the limit necessary to permit of the timely repair of worn tissues, is not only a harmless, but a conducive circumstance. It is, in fact, by living as far as possible a life in accordance with natural law that we may expect to reap the appropriate result in its prolongation. Civilization is at once helpful and injurious. Under its protecting influence normal development at all ages is allowed and fostered, while the facilities it affords for self-indulgence are constantly acting in an opposite direction. The case of Hugh Macleod, aged almost 107, which has lately been published, illustrates in a remarkable manner the truth of these observations. This man, a Ross-shire Highlander, in what must be the somber twilight of a blameless and fairly active life spent in his native county, still shows, it is said, a notable degree of vigor. He takes a lively interest in the affairs of life, has good appetite, is generally healthy, cuts and carries his peat for household use, and goes about among his neighbors as of old. His food is of the plainest, though nutritious—porridge, fish, a little meat; and his habit in this and other matters is not unworthy the attention of many who are daily hastening by opposite courses the end of a merrier, shorter, but perhaps not happier life.—*The Lancet.*

Sir Edwin Chadwick.

Full of years and honors, Sir Edwin Chadwick, K. C.B., the father of modern sanitary science, died on July 5 at his residence, Park Cottage, East Sheen, in his 91st year. Educated as a barrister, Edwin Chadwick early devoted himself to the study of the causes of zymotic diseases, and the means by which the losses of health and life resulting therefrom could be diminished. Chadwick then preached to a generation with ears that were deaf and eyes that were blind to the startling facts he brought before them; but though his views on cleanliness were rudely ridiculed, Jeremy Bentham left him a small legacy and part of his library. Earl Grey nominated Chadwick in 1833 as assistant commissioner to inquire into the operation of the Poor Laws of England and Wales, and the outcome of his searching investigations and elaborate report was the passing of the Poor Law Act. Mr. Chadwick was appointed secretary to the Poor Law Board, and during more than twenty years his labors in connection with it and the general board of health were untiring. Factory labor, half time, and instruction occupied some of his attention. In 1838 he obtained a special commission of inquiry into the prevention of disease and the improvement of dwellings in England and Wales, and in 1843 one on interments in towns, which laid the foundation for subsequent legislation. In 1848, Mr. Chadwick was appointed a commissioner of the general board of health, from which he retired nearly six years later on a well deserved pension of £1,000. His services to the country were only tardily and grudgingly acknowledged. Created a C.B. in 1848, he was only a twelvemonth since advanced to the rank of knight in the same order. His labors have been indefatigable in all matters relating to the health and welfare of the people, and were continued to the last. His volume on "The Health of Nations," of which an abridged edition, revised by Dr. W. B. Richardson, has just been published, is a standard work on the subject of the benefits conferred on the people by attention to hygienic rules. Chadwick was an earnest worker in the Sanitary Institute from its formation, and was half a dozen years president of the newly organized Association of Public Sanitary Inspectors, and his address to that body, read in his absence through enfeebled health, at the Annual Congress, at Leamington in October last, was as fresh and vigorous in style as any of his earlier writings.—*Building News.*

Life on Lake Titicaca.

SOLON I. BAILEY.

Lake Titicaca rests in the elevated plateau between the eastern and western ranges of the Andes.

The mean elevation of its surface is 12,505 feet above the level of the sea, or about twice that of the summit of Mt. Washington, White Mountains.

It lies northwest and southeast. Its greatest length and width are about 120 and 50 miles respectively. It holds the well-known distinction of being the loftiest lake in the world upon which any considerable navigation is carried on. At present two small steamboats make regular trips on the lake between Puno, in Peru, and Chililaya, in Bolivia.

This steamboat service supplements the railway system from Mollendo to Puno, and together with a well equipped stage line from Chililaya, completes the connection between the Pacific and La Paz. The present terminus of the railway is Puno. Neither this nor any other line of railway reaches La Paz, as has been incorrectly affirmed by some American publications. The distance from Mollendo to Arequipa is 107 miles, and from the latter city to Puno 218 miles, in all 325 miles from the ocean to the lake. Between Arequipa and Puno the road crosses the crest of the Cordillera, or Western Andes, reaching, at Crucero Alto, the elevation of 14,666 feet, making it without doubt the loftiest railway in actual operation in South America.

From Puno across the lake to Chililaya is 104 miles, and 36 miles thence by stage to La Paz.

From Juliaca, on the Puno division of the above railways, is a branch road extending northwest. This is known as the Cuzco division, but at present it only reaches Santa Rosa, a distance of 82 miles from Juliaca and less than one-third the distance to Cuzco.

The ancient capital of the Incas has not yet been disturbed by the whistle of the locomotive, but it is proposed to extend the main line around the southern shore of the lake to La Paz, and the branch to Cuzco.

The two small steamboats, of some 60 tons burden, now running on the lake, were built in England as gunboats for the Peruvian government. Before the construction of the railway, they were brought in sections on the backs of men and animals from Arica, and set up on the shores of the lake. Not proving necessary as a protection against Bolivia, they were remodeled for merchant service and have made regular trips for some years. They are not fast boats, but speed is not necessary where the only competition is with Indian "balsas." The lake is very deep in many parts, but unfortunately near Puno and Chililaya it is quite shallow, especially in Puno Bay, requiring considerable dredging. The fuel used on these boats is unique in steamboat navigation. Coal is very expensive. To run each boat one hour requires 400 pounds of coal, costing four dollars. Llama dung is, however, collected in great quantities by the Indians and sold in sacks containing four bushels at 10 cents per sack. Eight sacks of dung run the boat one hour and cost but 80 cents, only one-fifth the expense of coal. The fire thus furnished is sufficiently hot, but is quite unsteady, and with much waste, causing the engineer and firemen some annoyance.

This same fuel is used in all this region for cooking. In this connection it may be of interest to state that on the locomotives that run between Mollendo and Puno is used a fuel called "yareta," a moss-like form of vegetation which grows in dense conical masses from one to two feet in diameter. It contains considerable resinous matter, and makes a hot fire. It grows on the lofty plateaus and mountains, is cheaper than coal, and is used in considerable quantities.

When the depth of the water will allow, two small steamers also ply on the river Desaguadero, as far as Nasacara. The river Desaguadero forms the only outlet for Lake Titicaca, and though it is a stream of considerable size, it is evident that more water flows into the lake than finds its way out by this channel. Owing to its great area and its position, no doubt a vast amount is lost by evaporation. In fact the water, though apparently fresh in the deeper parts, has, near the shore, an alkaline taste.

The small steamboats mentioned do not comprise all the navigation that takes place on Lake Titicaca. Formerly they made trips around the lake to various small ports, picking up cargoes. Now the trade between Puno and Chililaya and the Desaguadero River takes all their time, and their place in other localities is in part taken by the Indian and his balsa. The balsa of Lake Titicaca is an interesting craft. It is constructed of the reeds that grow abundantly in the shallow places. These are bound together into huge bundles of the desired length. Two of these bundles fastened together and turned up at the ends, in canoe fashion, form the raft or balsa proper. Two smaller bundles form rude gunwales. A sail is made of the same materials, and by this and a long pole the Indian makes his way for considerable distances. Speed is not necessary, for he is in no hurry. These balsas have been used for many generations. A commentary on the Indian character is furnished by the following incident: When unable to use his sail, he must paddle his craft slowly and laboriously by means of his pole. A gentleman, desiring to improve their condition, procured some oars with broad blades for their use, but these they refused, remarking that poles had served their fathers well and hence were good enough for them also. From the northern parts of the lake the Indians bring fruit and vegetables to Puno for sale.

From the islands of Taqueli and Soto are brought pebbles—from the former black or drab, and from the latter white. These are used for the variegated pavements in the courts of the better houses. The Indians avoid, however, the more exposed portions of the lake, as violent storms occasionally sweep over it. At such times even the steamboats find it necessary to change their course, and passengers are especially liable to seasickness.

A Peruvian gentleman, for fourteen years a purser on Pacific steamships without a touch of seasickness, experienced a severe attack of this unpleasant malady during a storm on the lake. Not far from Puno is a little fishing town, the huts being built on the steep, rocky hillside and the balsas drawn up on the shore. The lake furnishes abundance of good fish, and the surface near shore swarms with a variety of water fowl. Several islands are inhabited. The largest is Titicaca, sacred in Peruvian annals, for on its bleak northern end is the spot where Manco Capac, divine messenger from his father, the sun, first stepped. He certainly chose a bleak and unpromising spot from whence to start on his beneficent mission.

On Titicaca and Coati, near by, are the ruins of various so-called palaces of the later Incas and temples for the priests and virgins of the sun. These islands now belong to Bolivia, and for political reasons no one is allowed to land on them without special permission from the government. Among these monuments of the past live to-day a few Indians, really but serfs in a land once ruled by their ancestors. On the southern end of Titicaca is a large sheltered bay, with pleasant hills sloping up from the shore, with cultivated fields and the huts of the natives. Both here, however, and on the plateaus surrounding the lake, the climate is severe and the conditions of life hard, and furnish a good commentary on the genius of the Inca race. Corn will not ripen, or with the most extreme difficulty. The only cereals capable of cultivation are barley, quinoa, and cañagua. The summer and rainy season is from November to March. During this time whatever agricultural labor is to be done must be accomplished. Even during this season sleet is not uncommon, and snow lies low on the surrounding mountains. By birth and experience inured to the rigors of such a climate, with bare legs and feet, the natives seem not much affected by the cold. Lake Titicaca never freezes over, yet ice forms near shore. In winter the temperature is often far below the freezing point. Yet the lake must tend to equalize the temperature. On the Bolivian side, at 5 P. M. of November 26, I found the temperature of the air 52° F., and that of the water 58°. At 7 A. M. the following morning, in the Gulf of Puno, the temperature of the air was 42° and of the water 57° In the middle of the day no doubt the air is warmer than the lake. To the north of Titicaca, toward Cuzco, there are some populous towns, and the people are largely engaged in caring for the enormous herds of cattle of the great land owners.

For this labor each receives about $25 per year, besides which they are allowed some of the sterile land for cultivation. Their poverty can be judged by the fact, vouched for by a Peruvian gentleman of wealth and position, that although a whole sheep can be had for 40 cents, these Indians are too poor to eat meat.

Strong drinks have to a large extent taken the place of the comparatively harmless "chicha," adding to their misery. They live in little adobe houses, with earth floor and usually grass-thatched roof. To keep warm they have a small door, and for a window one little opening from four to six inches square. On the Bolivian plateau the condition of the Indian seems more favorable. Yet everywhere they appear fairly contented. They have no Yankee love of change; no dreams of political advancement haunt them. Seeing them, one can understand how they were content under the paternal despotism of the Incas. They are quiet, stupid, and superstitious. Yet they have not forgotten their origin. The very air in Peru is full of the past. Stories of the glories of the Incas, and of treasures buried and not yet found, are everywhere current and everywhere believed.

In a great cathedral I saw an Indian with rapt face worshiping before an image of the Christ. But the image was decked out in the full garb of an Inca. Even in his religion—and he is very religious—the Indian seems to be thinking of the past, when, instead of belonging to a servile race, people of his blood held sway over a country embracing the present limits of Ecuador, Peru, Bolivia, and Chili. Apparently he has lost much by the Spanish conquest. In contact with a higher civilization he has not held his own. A so-called Christian conquest accomplished the material, moral, and religious degeneration of the Indian of the Andes.

Natural Gas in Utica, N. Y.

On July 10, a vein of natural gas was struck in a well being drilled for the National Brewing Company, on their grounds on South Street, the site of the old Eaton Match Company. The well is six inches in diameter and is being drilled by the veteran well driller P. H. Foley, of this city. From almost the very first the drill penetrated black slate rock, in which it remained for 555 ft. No water was found, and throughout the entire drilling it has been necessary to pour water into the hole in order to operate the sand pump. At 555 feet the Trenton rock was struck, and alternate layers of the hard sand rock and water lime streaks were found from that time until the gas was reached, at 570 ft. As soon as it was discovered that the well was furnishing some gas, a cap was put on the top of the one length of casing, and a small pipe about fifteen feet long was attached, so as to convey the fluid about the drilling apparatus. The gas was then lighted, and it gave out a strong, steady flame two or three feet in height throughout the night. The flow continues to-day without any apparent decrease in volume, and bears every evidence of keeping up as it has started. The gas burns with the peculiar solid rose-colored flame always found in the gas from the Pennsylvania wells, and betrays none of the blue streaks and sputtering of swamp or pocket gas. Mr. Foley, who has drilled wells all over this country, and many in the city, is confident that the drill has penetrated the first seams of a strong and paying gas vein. For a number of years he has been strong in the belief that Utica was situated upon a paying gas belt. Two years ago, while drilling a well for the Globe Woolen Mills, Mr. Foley found a strong vein of gas at 800 ft. The flow at that time was so strong that the gas took fire and was put out with difficulty. The well was intended for water, and so the gas was cased out and the drill sent down until the water was found. Much difficulty was experienced in casing out the gas, the pressure being so strong that the casing was bent and split when the first attempt was made to place it. Several other wells have been drilled by Mr. Foley in which gas has been found, and he has attempted to get some of Utica's capitalists interested in the matter, but they have always thought the speculation a hazardous one. The present find, however, is so pronounced in its nature that there is now a strong probability that the territory will be tested. The National Brewery Company is after water, but if they have touched a gas vein instead, as now seems most probable, it will prove of more value than would water, which can be procured from other wells. The fact that gas is found at such a depth, and is covered with such an impenetrable covering of slate, would indicate that it is pretty sure to be "a stayer."—*Utica Observer.*