

THE SOUTHPORT AQUARIUM AND WINTER GARDEN.

A few miles to the north of Liverpool, on the Lancashire coast, England, is a newly grown watering place, Southport. Its beauty and salubrity have gained it renown among the inhabitants of the scores of manufacturing towns in its immediate neighborhood; and it has become a very popular resort, being within a short railway journey of the homes of many millions of people. The Southport folks have recently embellished their town with a building comprising an aquarium, a winter garden, a music hall, and a large covered promenade. The conservatory or winter garden, shown in our Fig. 1, is a large and graceful structure of iron and glass, and contains not only a fine collection of rare tropical and other plants, but also birds and animals, making a nucleus for an extended zoological exhibition. This has been wisely entrusted to the care of Mr. Frank Buckland, the friend of all living creatures and the editor of *Land and Water*.

The aquarium, Fig. 2, is excellently arranged, being mainly lighted through the tanks containing the specimens, so that they may be seen to advantage. It is a solid and imposing structure. The exterior of the building, with the entrance gates and a portion of the grounds, are shown in Fig. 3.

"The edifice," says Mr. Buckland, "must be inspected to obtain an idea of its beauty. In general outline it reminds us of the Crystal Palace. One side only of this crystal palace is at present in existence, but there is ample space (now occupied by houses) to complete the other wing."

Adjoining the dome is a promenade, which at the night of opening was so full that it was almost impossible to move about. On the walls of this were exhibited some of Mr. Rolfe's fish pictures. Here also was exhibited a salmon caught by the rod in the Ness, 32 pounds in weight. I cast him. Mr. Rolfe painted him in his best style, and we conjointly had the pleasure of presenting him to the aquarium. He is represented as lying in a basket on straw, and the deception, to those who had never seen Mr. Rolfe's works before, was very satisfactory, the difficulty being to prevent people from tapping the fish to see if it was real. A glass case is being prepared for its reception.

The aquarium cannot be seen from above ground. The space underneath the winter garden is entirely occupied by an immense tank for sea water; it communicates with two other tanks which are used as occasion requires.

The sea water is supplied from the public baths, whence it is conveyed by means of a pipe; abundance of water is available from this source. The aquarium itself is partly under the promenade and partly under the winter gardens. Under the promenade are twenty-two tanks, the light being let in from the top by day, and illuminated by gas at night.

The fish in the various tanks are as follows: Congers, ling and codling, mullets, father lashers, sea trout, wrasse, anemones and whiting, dog fish, gurnards, crayfish and crabs, whiting, rays and soldier crabs, soles, turbot and flukes, monkfish, toppers, lobsters, king crabs, octopus, *Maia squinado* and edible crabs, stickle backs and anemones, bass or sea-perch, cod, salmon, great lake trout, and gold schlei or golden tench, and large dog fish.

SULPHUR IN SICILY, AND ITS REDUCTION FROM THE ORE.

BY PROFESSOR G. VON RA'UH.

The strata in which the sulphur occurs belong to the tertiary formation, and, according to Mottura, to the miocene epoch. They extend over a large portion of the island, the greatest length from east to west being about 100 English miles, and the greatest breadth, 53 to 56 miles. Within this large tract, the sulphur formation appears in groups. The oldest rocks of this tract are sandstone, which rest upon gneiss and slate. On these sandstones are marl beds, which resemble keuper marl; then follow limestones both jurassic and cretaceous, and eocene nummulitic limestone, with a pe-

wood. The thickness of the sulphur deposit, in its frequently recurring changes, often remains very constant, and indicates an equally regular change in the conditions under which it was deposited; it almost reminds a person of the changing seasons. The fishes found in the sulphur marl enable us to recognize the sulphurous strata as formed by fresh water.

Parodi states that the average percentage of sulphur in the sulphur rock of Sicily is 12.5 per cent. When it contains less than 6 per cent of sulphur, it does not pay for mining and smelting. In 1871, Sicily produced 150,000 tons of sulphur, probably nine tenths of that produced in the whole world. This production is continually increasing. That this natural wealth does not prove a greater blessing to the country and its prosperity is principally due to the circumstance that in Sicily the property on the surface cannot be released from that of subterranean treasure, and this circumstance results in a number of other evils, which do not permit mining to emerge from its great and almost inconceivable imperfection.

The number of sulphur mines in Sicily is upwards of 600, not more than half of which are worked at present; and of these, only about 50 are of considerable importance.

In looking for the sulphur deposits, a soft kind of gypsum, formed by the decomposition of the sulphur-bearing lime or calcareous marl, plays an important part. In general, the sulphur is combined with gypsum, and the presence of the latter renders it probable that the former is near. To reach the deposits, inclined shafts are dug, having an inclination of 25° to 50°, seldom steeper, and more seldom horizontal. Neither horizontal galleries nor vertical shafts are employed, since the former would not reach the sulphur soon enough, and the latter would require the use of some sort of machinery; and wood is lacking for this purpose, as also for timbering and frame work. Steps are cut into the inclined plane, and when it is not steeper than 45° the steps reach all the way across; but when steeper, two steps are cut side by side, alternating with each other. The young laborers climb up and down these high, narrow, and slippery steps, panting, groaning, and sweating—carrying on their heads and backs heavy bags filled with sulphur ore. They make from 16 to 18 ascents and descents daily, to and from a depth of over 200 feet.

By this pitiable method, at least a million tons of sulphur ore are annually brought up into the light of day by boys and youths. Nay, too, the little drippings of water are collected in stone jugs, and brought up in the same laborious manner. The mine is almost always abandoned when it reaches the water

level. The temperature in these is very high, 111° Fahrenheit, and, owing to the moisture in the air, it is almost unendurable. The diggers (*picconieri*), owing to the heat, work naked, or only wearing a small apron. The sulphur rock is so soft that it is cut out with a large instrument like an ax. The roof of the mine is supported by pillars, so that a considerable portion of the ore is left standing, to secure the structure. In order to obtain the mass of the pillars, they are weakened more and more, until, at an unexpected moment, the roof falls. The fallen and broken mass is left for a time, until it adheres together; shafts and galleries are then dug through it to get at the pillars. When



SOUTHPORT, ENGLAND.—Fig. 1.—THE CONSERVATORY.

culiar porous limestone in crags and ridges. On the top of the latter is a foraminiferous marl of marine origin, after which follows a stratum of tripoli, upon which is a stratum of calcareous marl, which is in some places more argillaceous, in others more calcareous. This is the stratum which contains the sulphur. The sulphur formation is generally covered over with immense masses of gypsum, on which again is a foraminiferous marl. Then follows the pliocene formation, blue clay, and yellow breccia.

It is probable that the quite extensive deposits of salt, found in widely distant portions of Sicily, were formed at the same time as the deposits of sulphur. The rock



Fig. 2.—THE AQUARIUM.

There are also some very handsome table tanks and aquaria, containing collections of anemones, gobies, fifteen spine sticklebacks, prawns, and Norway lobsters. Orders and regulations have been laid down by the board as to feeding the fish, cleaning the tanks, etc. There is a seal tank, and some fine specimens of the sea trout.

AN Illinois editor returns thanks for a centipede sent to him by mail from Texas, "it being," he says, "the first cent of any kind that we've received for several weeks."

salt enclosed in the clay strata is often very pure. The deposits of sulphur are not usually of great extent, and do not seem to be in immediate communication. The sulphur impregnates the strata of clay and limestone, appearing either in irregular threads and veins, or in layers three to six feet thick, alternating with the layers of rock, or in round concretions from 0.4 to 0.8 of an inch in diameter. Barytes and imperfect crystals of calx spar accompany the sulphur, and, more rarely, beautiful crystals of celestine. Sometimes the sulphur strata enclose whole stems of fossil

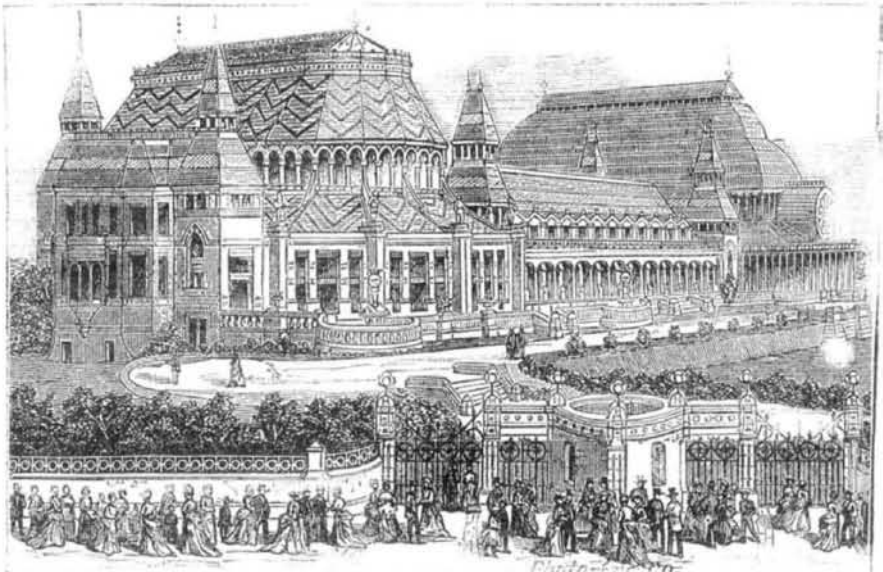


Fig. 3.—EXTERIOR OF THE BUILDING.

the sulphur-bearing strata lie one above another, there is a double set of pillars. Through errors in the ground plan and ignorance of mining surveying, it generally happens that the pillars in the upper gallery do not agree with those in the gallery below. As the stone is often soft and brittle, it is no wonder that they frequently break through.

The condition of the sulphur miners is extremely deplorable. The manner of living in populous spots miles distant from each other, instead of in villages, is peculiar to that country, and the majority of the mines are far distant from