

NEW TEXAN OIL DEPOSITS.

BY DAY ALLEN WILLEY.

The extent of the petroleum deposits which underlie portions of the States of Louisiana and Texas is a problem which remains to be solved, but the results which have thus far been obtained in sinking wells show that a very considerable area of territory contains oil in large quantities and that in some instances several deposits may exist, one beneath another. At the time the Beaumont district became exploited through the famous Lucas well, the opinion prevailed that this section contained the great bulk of the petroleum existing in the Southwest, owing to the enormous flow from the Lucas and other wells. It is estimated that the former would gush about 50,000 barrels every 24 hours until it was brought under control. After the Beaumont district became what oil men call a pumping proposition, no very large wells were brought in until the latter part of 1903, when a gusher, which is asserted to be second only to the Lucas in the quantity thrown out, was struck at a place called Batson's Prairie, 14 miles north of Sour Lake and about 30 miles from the Beaumont district. A well which reached the oil-bearing strata on December 1 began flowing at a rate of 500 barrels daily. The same company was also engaged in boring a second well on its property. This reached the oil about December 20, and it began flowing at what oil operators claim to be a rate of probably 30,000 barrels every 24 hours. Heretofore few signs of oil have been found in the locality, and the "strike" came in the nature of a surprise, with the result that prospectors and investors have left other portions of the Southwest by the score, and are buying land and boring wells as near the gusher as they can locate.

The Beaumont oil boom attained its height during the first six months of 1901. During the last two years, however, other districts in Texas and Louisiana have been exploited sufficiently to prove that several other fields undoubtedly contain a very large quantity of oil. They include the Sour Lake and the Saratoga in Texas, as well as that at Batson's Prairie, the scene of the latest development, and the Jennings district in Louisiana. During 1901 the idea of boring for oil in the vicinity of Sour Lake was agitated, and early in 1902 enough producing wells were sunk to cause an influx of people and capital, many deserting Beaumont for the new district. Sour Lake, which is located 18 miles west from Beaumont, takes its name from a small body of mineral water fed by springs, and up to the time of the oil discovery had been a health resort. In its vicinity is an extensive pine forest bordered by prairie. The woodland as well as property immediately around the lake were taken up so rapidly by oil operators, that already several hundred derricks have been erected, many of them of the timber which came from the pine trees cut down to make space for them. While no very large wells

have been struck, there are a number steadily flowing at a rate of 300 barrels. One of the notable facts is that so few of the wells have failed to reach the oil deposit. At present this territory is producing nearly 300,000 barrels monthly, and is contributing a large quantity of the oil which is being refined in the Texas plants, as it is connected with the refineries, also Port

its population was estimated at over 10,000, while the people are coming into it so rapidly that it will probably have 15,000 by the beginning of 1905, if not more. As in the case of the Beaumont field, property values have risen to fabulous prices by reason of the discovery, land selling as high as \$30,000 an acre, which originally could have been bought as low as \$15 and

\$20 an acre. The Saratoga field, which is situated 30 miles northwest from Beaumont and 12 miles from Sour Lake, began to be developed with the decline in production at Beaumont. At present it is producing about 1,000,000 barrels yearly, some of which is piped to the refineries, but a large quantity is stored, as the companies have an extensive reservoir capacity. With the exception of the two wells referred to no others of importance have yet been struck in the Batson's Prairie district; but so many are being bored that its production will probably be greatly increased within the next few months, unless it should happen that the original wells had been dug into what the miner would call a pocket, containing only a small quantity of petroleum.

The oil-bearing territory of the Southwest has been termed the Gulf coast oil field. Geologists who have thoroughly examined this section of the United States are of the opinion that it extends from a point about 150 miles west of New Orleans, in Louisiana, a distance of fully 150 miles. It is parallel with the Gulf of Mexico, and varies considerably in width. The most important developments in the eastern section of the oil-bearing region are at Jennings, which was developed about the same time as Beaumont, and where some very large wells have been struck. The Jennings district is still producing in large quantities, and the indications are that it has a very extensive supply. Although but a comparatively small portion of the Gulf coast has been tested by the well-borer, as is indicated, oil in large quantities has been found at its extremities; and if the area which thus far has not been examined produces in the same proportion as those which have been developed, there is reason to believe that the supply from the entire field is so large as to be inexhaustible, and that in a few years it will become one of the greatest petroleum-producing sections on the globe, not excluding the Baku fields or those of Pennsylvania or West Virginia.

That deposits of petroleum lie beneath one another is proved by the experience of the well diggers. At Beaumont, oil was reached at depths ranging from about 900 to 1,100 feet. The larger wells near Jennings were struck at a depth of over 2,000 feet, while at Batson's Prairie the wells range from 750 to 1,200 feet in depth. Oil is found at Sour Lake and Saratoga at about the same depths as at Beaumont.

The probabilities are that only an occasional gusher will be struck in the Southwest in the near future; but so many wells are producing steadily and abundantly by means of pumping machinery, that pumps



A LAKE OF OIL.



SCENE IN THE OIL FIELDS, SHOWING THE CLOSENESS OF DERRICKS.

Arthur, by pipe lines. The Sour Lake district as yet is confined to a very small area, but the wells are so near together that one can see rows of twenty and more extending through lanes which have been made for them in the pine forest. The best indication of the development of this field perhaps is shown in the growth of the town of Sour Lake. Two years ago this was a stretch of uninhabited prairie, but on January



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operated not only by steam, but compressed air and electricity, have been installed very extensively. The oil operators are also exercising much care in husbanding the supply, and construct reservoirs and pipe lines as the wells are dug, in order to secure the output from the beginning of the flow. The reservoirs are of several kinds. Steel tanks have been erected on a large scale, as well as vats made of cypress wood.

Earth reservoirs are still used, although they are a decided improvement upon those which were hurriedly excavated in the early days of the development. Very few of them are open trenches. Dug out of the prairie, they are lined upon the side with hard clay or concrete, sometimes planking tightly fitted together, while the bottom is generally made of concrete. Over the top is laid a roof of wood covered with asbestos or some other weatherproof material. This form of reservoir is economical in construction, while it has the advantage of holding a large quantity of oil and keeping it free from impurities, although it does not offer as great storage facilities as the steel or wood tanks. The Texas field at present has a reservoir capacity of fully 20,000,000 barrels, but the refineries are taking a large share of the product, as the construction of these plants has been rapidly increasing, and over twenty have been erected since 1901. One which was built at a cost of \$4,000,000 is among the largest in the world.

STARFISH AND THEIR INJURIES.

BY W. FRANK M'CLURE.

Crippled starfish offer a most interesting subject for study among the inhabitants of the deep sea. Very many of them are to be found in the ocean depths, just as there are large numbers of maimed people to be seen on land. The collector seeking perfect specimens will perhaps pass by the crippled starfish, while others will find in their deformity a wondrous thing. In Ashtabula, O., there is a rare collection of several hundred starfish cripples owned by Dr. F. D. Snyder, who is a member of the American Association for the Advancement of Science. Some samples of this, in many ways, remarkable collection, which also includes perfect specimens from widely-separated sources, are pictured in the accompanying photographs.

Unlike man, the starfish which loses one of its "arms," or properly its rays, grows a new one to take its place. Under certain conditions it grows two to take the place of one. This

latter accomplishment is illustrated in the picture of the *Echinaster*, which was found in South American waters, also in the *Archaster angulatus* from Mauritius. In one of the specimens of *Asteria vulgaris* injuries to two arms will be noticed, with the wounds healed and new growth started. In the case of the *Echinaster* and the *Archaster angulatus*, the growing of the two rays is accounted for by the fact that in the breaking of the original ray it was split. Had it broken off squarely, only one ray would have taken its place. Other forms of cripples will be easily recognized in the photographs.

A starfish may lose all its rays without losing its life, and very often a cripple with but a single ray left is found by fishermen and collectors. When completely broken in two, the starfish becomes two distinct fish, and the growing process continues. The

brittle starfish, it is believed, in many instances breaks off its own rays at the approach of danger. For this reason it is difficult to obtain as perfect a specimen as that represented in the illustration of the *Ophiocoma aethrops*, which is owned in Ashtabula, and which came from Panama. These rays are almost intact.

But there are other points in connection with the starfish of the world which are wonderful and instructive aside from the marvelous accomplishments of the cripples. The great variety of shapes alone is beyond the conception of those who have not made deep-sea fish a study. To many people starfish would not be starfish unless they were possessed of rays and resembled in construction a star. To all such the *Culcita pentangularis* will be a revelation. As its name indicates, this fish is pentangular in form. The

ach. The mouth of the starfish is in the center of its rays. The specimen of the starfish eating shown in the photograph is a typical one.

The body of the live starfish is comparatively soft. In traveling, it is said that it fully adjusts itself to the irregular surface of the sea bottom. Passing through an opening of small dimensions is accomplished by pushing one arm through first, at the same time folding the others back sufficiently to admit of forcing the body forward.

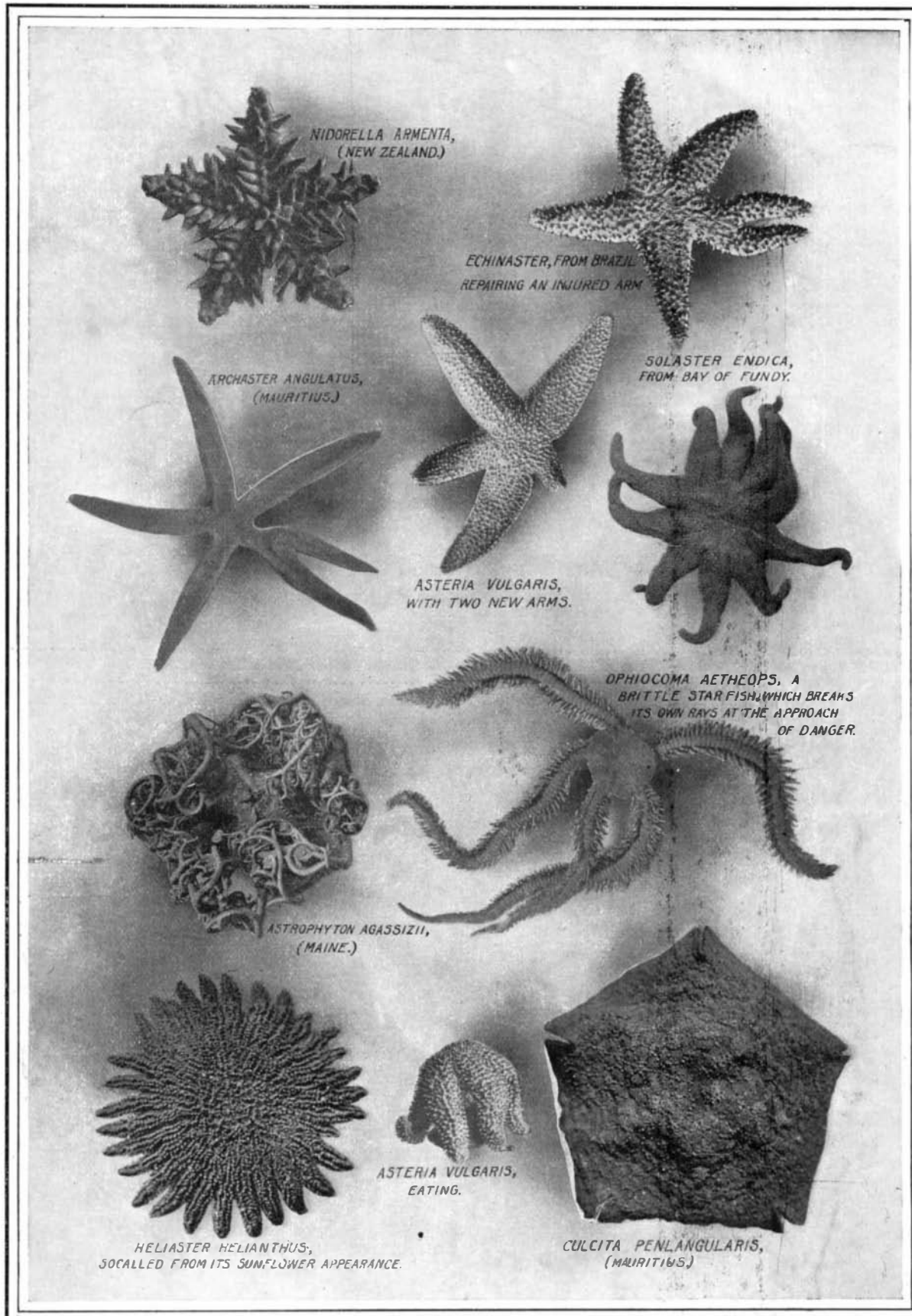
Some great ships are to-day employed almost wholly in seeking for starfish specimens in deep seas, and there are hundreds of men who spend a portion of their time in collecting starfish in the interests of science. Many of the specimens collected by ships are taken from depths of one and even two miles. The pressure which these fish withstand at this depth is of course very great.

How Radium is Obtained.

In spite of the fact that the marvels of radium have been so widely discussed and have created such a flurry of excitement not only in the scientific world but among the general public, probably very few people are acquainted with the method by which it is secured in the minute quantities that are as yet available. That the element is obtained from pitchblende is generally known, but some details of the exact process will be of interest. According to the *Lancet*, operations for the extraction are commenced by crushing the pitchblende, and then roasting the powder with carbonate of soda. After washing the residue is treated with dilute sulphuric acid; then the sulphates are converted into carbonates by boiling with strong carbonate of soda. The residue contains radium sulphate, which is an exceedingly insoluble salt. The soluble sulphates are washed out, and the residue or insoluble portion is easily acted upon by hydrochloric acid, which takes out, among other things, polonium and actinium. Radium sulphate remains unattacked, associated with some barium sulphate. The sulphates are then converted into carbonates by treatment with a boiling strong solution of carbonate of soda. The carbonates of barium and radium are next dissolved in hydrochloric acid and precipitated again as sulphates by means of sulphuric acid. The sulphates are further purified and ultimately converted into chlorides, until about 15 pounds of barium and radium chloride are obtained by

acting upon one ton of crushed pitchblende. Only a small fraction of this mixed chloride is pure radium chloride, which is finally separated from barium chloride by crystallization, the crystals from the most radioactive of the solutions being selected. In this way the crystals ultimately obtained are relatively pure radium chloride of a very high degree of radio-activity.

There are now five coal-producing districts in Siberia, not including the Kouzentsky basin, the development of which, despite its extraordinarily rich deposits, is prevented by lack of transport facilities. In 1900, about 10,000,000 pounds of coal were supplied by the Tcheremkhovo district, near Irkutsk, as fuel for the Siberian railway. The other coal districts are Soudzenkovo, Ekibaztouz, Saghalien, and the coast of the Maritime territory.



CURIOUS FORMS OF STARFISH.

specimen in the illustration is from Mauritius. Another interesting shape is found in the *Heliaster helianthus*, which derives its name from its resemblance to a sunflower, and which is often found in South American waters. The creature is one of the most beautiful animals that inhabit the sea.

The manner in which the starfish travels, and the way in which it eats, represent two more interesting features of those queer specimens of deep-sea life. As, perhaps, nearly everyone knows, the starfish can neither see nor hear. Neither has it the sense of smell. In spite of these seeming impediments, nevertheless, it seeks and devours its prey as neatly as an ordinary fish. The starfish lies upon its prey and folds its "arms" or rays completely about it. It then pushes its stomach out through its mouth, and will wrap even a large oyster and shell within the folds of the stom-