

bines. In driving ahead in the ordinary way, the steam from the boilers is admitted to the high-pressure turbines, and after expanding it about five-fold, it is passed to the low-pressure turbines, where it is expanded about twenty-five-fold more and then passed on to the condensers. This gives a total expansion ratio of about 125-fold. At twenty knots speed—and this has already been obtained without any excessive driving—the speed of the center shaft is 700, and that of the two outer shafts 1,000 revolutions per minute. When coming alongside a jetty or maneuvering in a harbor, the outer shafts only are used, and steam is admitted by suitable valves directly into the low-pressure motors, or into the reversing motors independently on either side of the vessel. The high-pressure turbine under these circumstances revolves idly, its steam admission valve being closed, and its connection with the low-pressure turbines being also closed by non-return valves. By this arrangement great maneuvering power has been secured. Up to the time of writing there have been several trials of the vessel, and the engineers declare themselves as perfectly satisfied with her last test. She easily made twenty knots, and even at this speed there was a noticeable absence of vibration. The comparatively small space occupied by the engines leaves large accommodation for passengers—a consideration of much value in the trade in which she will be engaged.

#### THE MOST PRIMITIVE AMERICAN SAVAGES.

BY WALDON FAWCETT.

After centuries of ineffectual effort to penetrate their rigid exclusiveness, something is at last coming to be known regarding that strange people, the Seri Indians, the fiercest Indians on the American continent and unquestionably the least-studied and most completely isolated race of people on the globe. There is something almost pathetic in the fact that what little information has been gleaned by the Bureau of American Ethnology, a branch of the United States government, has been secured on the eve of the total extinction of this, the most strongly marked and distinctive of the aboriginal tribes of the New World. For hundreds of years these savages, in many respects the most terrible fighters the world has ever seen, have been continually at war with their neighbors until now the population of the tribe, which a couple of centuries ago numbered several thousand, has been reduced to little over three hundred persons, of whom not more than seventy-five are adult males or warriors. The great dominant characteristic of the Seri is their absolute isolation in thought and life and feeling. It has no counterpart on earth to-day. More impressive still is the fact that the ages of life in their own little sphere, almost as completely isolated as though they inhabited another planet, have fostered in the Seri a bitter and implacable hereditary enmity toward all other human beings. All the mistrust and hatred which it is possible for one race to feel for another culminates on the borders of Seriland. The nearest neighbors to the Seri regard them as hardly human—a feeling fully shared by the Seri themselves, who deem themselves more closely akin to the beasts which they worship than to the despised humans haunting their borders. In very truth they stand alone in every respect, far out-Ishmaeling the Ishmael of old on Araby's deserts.

The geographic position of the Seri domain and its physical features assist these Indians, if not, indeed compel them to live a people apart from all the world. They inhabit Tiburon Island in the Gulf of California and a very limited area on the adjacent mainland of Mexico. Their little principality is protected on one side by stormy seas in which any craft must wage a hard fight for life and on the other by



PREPARING A SERI MEAL.

almost impassable deserts. Their home itself is too hard and poor to tempt conquest, being arid and rugged and consisting chiefly of desert sands and naked mountain rocks with permanent fresh water



FULL-BLOODED SERI.

in only one or two places. Finally their possessions are too meager to invite spoliation, but did they possess the treasures of the Aztecs they would be almost equally secure, since the natural terrors of this mod-

ern inferno would be likely to exterminate any civilized force which might attempt an invasion.

Both the Seri men and women are of splendid physique, they have fine chests with slender but sinewy limbs and are notably vigorous in movement, erect in carriage, and remarkable for fleetness and endurance. The members of the tribe subsist almost wholly on sea food, land game and fruits, and most of their food is eaten raw. They neither plant nor cultivate, and are without domestic animals save dogs, and these latter are little short of wild beasts. Their only habitations are flimsy bowers of shrubbery, occasionally shingled rudely with turtle-shells and sponges. The Seri clothing consists of a kilt or skirt extending from waist to knees, and the women indulge in the most fantastic symbolic face-painting.

At present polygyny prevails in the tribe, but in former years polyandry was practised.

The primary marriage is negotiated between the mothers of the would-be groom and the prospective bride. If the mother and daughter in the latter family look with favor on the proposal, the candidate is subjected to rigorous tests of character, and if these are successfully passed the marriage is considered complete and the husband becomes a privileged and permanent guest in the wife's household. In every phase of the life of these people there crops out their intense, fiendish hatred of all other human beings. In their estimation the brightest virtue is the shedding of alien blood, and the blackest crime on the Seri calendar is conjugal union with any person from the outside world.

These Indians, who have for centuries successfully stayed Spanish, Mexican and American invasion, worship innumerable mystical deities, most prominent among which are the pelican, the turtle, moon and sun. It is known that there are certain observances at the time of the new moon and that there are held annual ceremonies at various times, but the character of these no white man has ever been able to ascertain. How great is their secretiveness may be imagined from the fact that to this day no alien has ever seen the christening of their children, the burial of their dead or the ceremonies of their shrines.

In the olden days the Jesuit missionaries and after them the Franciscan friars and the secular officials sought to scatter the Seri by both cajolery and coercion, and endeavored to divide families by restraint of women and children and by banishment of wives. There are traditions, too, of the capture and enslavement of Indian and Caucasian women in Seriland, yet the fact remains that not a single mixed-blood Seri is known to exist, and not more than two of the blood now live voluntarily beyond the confines of the tribe, and these have been outlawed and could not return to their people if they wished.

It is impossible for a person who has not traveled through the country to understand with what mingled horror and terror and loathing the Seri are regarded through the length and breadth of western Mexico and in the southwestern portion of the United States. Their practices in warfare have afforded repeated proof that they are not only the most primitive but by far the most bloodthirsty and treacherous of the Indians of North America. Even at the present time, with their wasted forces, it would be little short of suicide for even a Mexican official to visit these Indians or land

on their island without an armed guard. Any white man, Mexican or Indian of another tribe coming in contact with them is killed without the slightest compunction unless they are restrained by fear.

In warfare they make use of the deadly poisoned arrows, and although the United States government explorers have virtually established the fact that these Indi-



GROUP OF SERI INDIANS.

ans do not practise cannibalism, as had been supposed until a few months ago, it is known that they habitually indulge in carrion eating. Added to these other gruesome details is the supreme horror which has been inspired by the accounts of offense and defense by nails and teeth which have been given by men who have met the Seri in battle. Such is the shuddering antipathy aroused by these bloodthirsty chronicles that, incredible as it may appear, many of the more timid neighbors of these wildest of Indians stand in greater dread of the natural weapons than of the brutal clubs and swift-thrown missiles of the Seri or even of their poisoned arrows.

The potency of the magical mystery which surrounds the Seri could not be more forcefully illustrated than by their relations with their nearest neighbors, the Papago Indians. The Papagos are known as among the most fearless and ferocious fighters in old Mexico; and yet when the United States government officials planned the recent expedition which has finally resulted in giving to mankind some little knowledge of the world's least-known inhabitants, it was only after tremendous efforts, in which threats and persuasion were mingled, that a few picked Papagos were induced to accompany the expedition as guards.

The Papago Indians were not only ready but wildly eager for fray if it could but be carried on at the frontier, but they shrank back in unmistakable dread from an actual invasion of the territory of their hereditary enemy as though it were some sacred realm, mere entry into which would bring down the annihilating wrath of the gods. At the outset the expedition was beset by storms, and all the powers of earth and air appeared to be arrayed against the enterprise, all of which the poor Papagos declared to be but just punishment for a sacrilegious infraction of an ancient law. The strain upon the women who had been left behind was fearful to behold, and the wife of one of the guards collapsed under the tension and died of her terrors. To all the Papago women and many of the men the safe return of the party was as the rising of the dead.

In the case of the Seri visited by the official investigators from Washington there were disclosures not less striking. A few of the men of the tribe had at some time in their lives made the three days' journey across the desert to a frontier post where a few white men are stationed, but none of the women or children or the young men had ever before beheld a Caucasian. The Seri were somewhat awed by the sight of the white men, but the presence of the Indians who had accompanied the expedition as guards produced a radically different effect. The explorers even found it necessary to keep the Papago interpreter and others of the tribe at a distance, for the mere sight of these inimical tribesmen threw the Seri women and children in a paroxysm of fear. The women huddled into circles facing outward, and some of them were deathly sick for days afterward as a result of the fright.

Strangely enough the Seri, whom the other Indians and Mexicans regard very much as a man does a rattlesnake, are among themselves fairly cheerful, and the families are unobtrusively affectionate, but the cheerfulness is instantly banished upon the approach of an alien. There is ground for the belief that the Seri systematically exterminate weaklings, and indeed did they not do so the literal races for life in which the bands now and then engage would be attended with far more serious consequences than is the case.

The fleetness of well-developed Seri and the powers of endurance possessed by young and old alike are simply astounding. Instances are on record where Seri hunters have actually run down and captured alive full-grown bucks, and they think nothing of capturing a frightened horse tearing forward at full speed. Knowing of their prowess in this direction, an enterprising Mexican conceived the idea of exhibiting several Seri as deer catchers at different European expositions, but all efforts to tame the Indians sufficiently for the purpose were unavailing.

The record of the warfare carried on by the Seri would form a most blood-curdling recital. None other of the aboriginal tribes of America has so sanguinary a history, and none other has at once so long and bloody a record. The principal Seri weapon is the arrow, and each arrow-tip is dipped in a horrible charm-poison composed of the most deadly creatures which exist—the fanged heads of serpents, the stinging tails of scorpions and the fiery feet of centipedes. The Seri do not know the meaning of open warfare or face-to-face fighting. Their favorite tactical device

is ambuscade; their warfare is wholly treacherous and cowardly in design and craven and cruel in execution.

Once the battle is begun the Seri warriors either discharge clouds of arrows from their places of vantage, or if they have helpless, unarmed men to deal with, rush forward to brain their victims with stones or to break their necks and limbs. Under such circumstances the rushing warriors are transfigured with frenzy; their eyes blaze purple and green, their teeth glisten through snarling lips, their hair half rises in bristling mane, while their chests swell and their lithe limbs quiver in a fury sudden and blind and overpowering. Should the assault be unsuccessful, however, the beaten warriors, their blood-frenzy quickly burned out, skulk silently behind rocks and shrubs or retreat across the sands with inconceivable fleetness.

#### Relation of the Mosquito to Malaria.

At a meeting of the National Biological Society, held November 19, 1900, Dr. C. W. Stiles, of the Department of Agriculture, read a paper, says the Chicago Record, advancing the theory that mosquitoes were entirely responsible for the disease we call malaria, and that without mosquitoes there would be no such disease.

"From a medical, biological and economic standpoint malaria is one of the most important diseases of man," said Dr. Stiles this morning. "The number of deaths annually from this disease throughout the world must be reckoned in hundreds of thousands, Italy alone averaging about 15,000 a year, while the number of sufferers must be counted by millions. Its economic importance may be appreciated when we take into account not only the deaths, but the time lost by those who are afflicted. From a military standpoint

skin. Only female mosquitoes attack human beings, the male mosquitoes feeding upon vegetable matter. These germs, running through the asexual stage in the human being, reproduce so rapidly that the ordinary parasite of tertian fever gives life to about 560,000,000,000 within twenty days' time. If we would exterminate malarial diseases mosquitoes must first be exterminated, for it is impossible for the parasite of malaria to complete its work without the aid of the mosquito.

"While there is a popular impression that mosquitoes have something to do with malaria, people generally believe that malaria is caught either from breathing swamp air or drinking impure water. It must therefore be expected that the results of recent scientific investigation will be doubted. Biologically, however, there is only one exception to the law that malaria is transmitted by mosquitoes. If a person in a certain stage of malaria should happen to be attacked by a biting fly or some other insect, and that insect should infect a healthy person with malarial germs, it might develop a case of malaria. Such an occurrence, however, would be exceptional.

"It sounds radical," continued Dr. Stiles, "to assert that the existence of malarial diseases is absolutely dependent upon mosquitoes, but the sooner the fact is realized the sooner we will get rid of these diseases. Man is not the only animal that has malaria, but no other has the same malaria found in man. A large percentage of sparrows, swallows and pigeons have a disease which corresponds to malaria, but it is not transmissible to man.

"I have heard it suggested that in some regions where mosquitoes are plenty malaria is unknown, and that malaria exists where there are no mosquitoes, but in plenty of places where man exists yellow fever is unknown. Other conditions must prevail to produce

malaria besides the presence of man. We must have man present for the disease to develop; secondly, we must have mosquitoes of the genus *Anopheles* to transmit the disease, and, thirdly, the germs which cause the disease. You can have mosquitoes and man in a given locality, but if the germs are not present the disease will not exist."

"Can you prove that malaria is not transmitted by the air or by drinking water?" Dr. Stiles was asked.

"This involves the demonstration of the negative," he replied. "It is impossible to demonstrate that the germs of malaria do not exist in the air. On the other hand, it is biologically impossible to conceive of their existence in the air. The burden of proof rests upon those who claim that malaria can be transmitted by breathing the air without the intervention of the mosquito. The idea that malaria is

transmitted by the air or drinking water is purely a theory, without proof back of it. It should be recalled that mosquitoes fly at night. Hence it is natural for people to infer that night air causes malaria. Furthermore, mosquitoes are common near swamps; hence the idea is prevalent the air of the swamps caused the disease."

Dr. L. O. Howard, the entomologist of the Department of Agriculture, tells of certain districts where malaria has been practically stamped out by killing off the mosquitoes. He is of the opinion that boards of health and municipal authorities will be forced to take up the question of the extermination of the mosquito in a systematic manner and thus rid their neighborhoods of the cause of this disease. While aware that many physicians are still skeptical regarding the transmission of malaria by mosquitoes, he urges a sanitary campaign against the malaria mosquito, which can be recognized by those seeking to exterminate him. He can be detected in the dark as well as during the day. His note in singing is about four tones lower than the ordinary mosquito, a fact that corresponds with the usual distribution of parts in operas, where the villain always has the bass.

Dr. Howard says the best method of exterminating mosquitoes is by pouring kerosene on the stagnant water where they breed. This kills the larvæ in the water and the adult female when she comes to lay her eggs. In cases where it is impractical to use petroleum, small minnows placed in the water will rapidly devour the mosquito larvæ.

What is said to be the longest train ever hauled on the Northern Pacific was moved from Jamestown to Fargo on May 17. The train consisted of 125 box cars, five of which were loaded. It was 5,530 feet long, or over a mile. The train was hauled by one of the large compound locomotives.



TYPICAL SERI HOUSE.

it is also important, since in some localities 40 or 50 per cent of the troops suffer with malaria every year.

"The cause of the disease was discovered in Africa by Dr. Laveran, a French surgeon, twenty years ago. He is at present engaged at the Pasteur Institute, Paris. He discovered in the blood a microscopic organism which he first thought was a plant belonging to the genus *Oscillaria*, but which has since been recognized as animal and placed in the genus *Plasmodium*. Three distinct species are known—one which takes only forty-eight hours to complete its cycle in man. That is the cause of the ordinary tertian fever, where the patient has a chill on alternate days. The second form takes seventy-two hours to complete its development, and is the cause of the quartan fever. The third form is the cause of the so-called irregular estivo autumnal fever.

"Although the parasite was discovered twenty years ago, it is only within two years that its life history has been worked out. This is exceedingly complicated and has a direct bearing upon the origin of malarial infection. It contradicts many popular ideas regarding malarial diseases, and it will take some time to convince the public that the conclusions are correct. However, there is absolutely no ground for skepticism. The parasite runs through a double cycle, and thus appears to us in two distinct forms. One cycle is present in the blood of the human being, and is the cause of disease. This microscopic organism is known as an asexual animal—that is, males and females cannot be distinguished. The other cycle is found in certain mosquitoes of the genus *Anopheles*. In this stage the animal is sexual, and males and females can be clearly distinguished. The parasite takes a position in the wall of the mosquito's stomach and there forms minute germs known as sporozoites, which gradually work into the glands of the insect. Then whenever the mosquito bites a person she leaves a few germs under the