

### HOW CORAL REEFS CAME

THE RESULT OF AGASSIZ'S LATEST INVESTIGATIONS.

Former Theories Upset and Nothing Satisfactory to Replace Them—Fascinating Differences in Various Regions of Coral Growth—Some Interesting Facts.

Prof. Alexander Agassiz has returned to his home in Cambridge after a five months' trip to the islands of the Pacific. It was made on the Yarella, a twin-screw steamer of about 400 tons, and there was a full outfit of dredging, sounding, and deep sea instruments, as well as materials necessary to preserve the collections. The day before leaving Cambridge for the Pacific news had arrived that the expedition of Prof. David of the University of Sydney had bored into the atoll of Funafuti to the depth of nearly 600 feet, the bottom being still in coral. But later experience would seem to indicate that a general theory of the formation of coral reefs is as far removed as ever. Prof. Agassiz says: "I came to Fiji under the impression that we were to visit a characteristic area of subsidence."

Dana, in his last discussion of the coral reef question, states that it is impossible to find a better series of islands than those of the Fiji to illustrate the gradual changes brought about by subsidence, which transforms a volcanic island with a fringing reef to one with a barrier, and next to one with a circular reef ring, and finally to one in which the interior island has disappeared, and has left only a more or less circular reefing. For these reasons one of the Fiji atolls promised to be an admirable location for boring and settling the question of the thickness of the coral reef of an atoll. My surprise was great, therefore, to find within a mile from Sava an elevated reef about 50 feet thick and 120 feet above the level of the sea, the base of the reef being underlain by what is locally called soapstone, probably stratified volcanic mud.

But the traces of extensive elevation are not limited to the larger island of Viti Levu. I found the islands on the rim of the atoll of Negele Levu to consist entirely of coral rock elevated to a height of over six feet on the larger island. It was found that at Vanua Mualu the northern line of islands were parts of an elevated reef forming vertical bluffs of coral rock raised by a central volcano mass of the main island to a height of from 500 to 600 feet. On the south of the main island they are much lower. At Mango the vertical bluffs are underlain by volcanic rocks, which crop out at the sea level. At Tavutaba the bluffs are probably 800 feet high, and at Lakemba about 250. On the island of Aiwa the elevated reef is fully 200 feet thick. On the three islands of the Yangasa group it attains a thickness of from 240 to 290 feet, and finally, on Onga it attains a thickness of nearly 300 feet, and at Fulanga 360. At Vatu Leile, the most westerly island we examined, the elevated reef forming the island is 110 feet thick at its northern extremity.

As far as we can judge from the Fiji Islands the shape of the atolls and of the barrier reefs is due to causes during a period preceding our own. The islands of the whole group have been elevated, and have, like the northern part of Queensland remained nearly stationary and exposed to great and prolonged denudation and erosion, which have reduced the islands to their present height, the platforms upon which the barrier reef corals have grown being merely the flats left by the denudation and erosion of a central island of greater size than that now left, while the atolls are similar flats from the interior of which the islands have been eroded, and the lagoons of which have been continually scooped by the action of the sea, the incessant rollers pouring a huge mass of water into the lagoon, which finds its way out through the passages leading into it.

In the Fiji Islands the atolls and islands or islets, surrounded in part or wholly by barrier reefs, have not been formed by the subsidence and disappearance of this central island, as is claimed by Dana and Darwin. The Fiji Islands are not situated, as was supposed, on an area of subsidence; but on the contrary, they are in an area of elevation, so that the theory of Darwin and Dana is not applicable to the islands and atolls of the Fiji group.

What the age of the elevated reef of the Fiji is I am unable to state. Its aspect and position show it to be of considerable age, probably antecedent to the present period. In many ways it resembles some of the late tertiary elevated limestone which I have seen on the northern and southern coasts of Cuba. She great thickness which the elevated coral reefs attain in this group, at least 800 feet, also shows that they may have been deposited originally during a period of subsidence taking place in our epoch or which could have had any effect in shaping the outline of the islands of the Fiji group and their accompanying reefs.

The evidence thus far collected on the Fiji shows the futility of boring in this ground. Any result obtained would merely at some point indicate the thickness of a former elevated reef—a reef formed in a period preceding our own. We should obtain information which could have no bearing on the main question, if I am correct in the interpretation of what I have observed; information, in fact, which may be obtained as one steams along, without the trouble or cost of boring. Should I be correct, it would be natural to look upon the results of the boring at Funafuti much in the same light and assume that the island, as well as others in the Ellice group, is also in the area of elevation, and that the great thickness of coral obtained was reached by boring in the base of an ancient reef. So that the results obtained by Prof. David from the boring at Funafuti do not assist us in any way in corroborating the theory of subsidence as essential to the formation of atolls.

However that may be, it only emphasizes what has been said so often, that there is no general theory of the formation of coral reefs, either barrier or atolls, of universal application. Each district must be examined by itself—at least such has been my experience in Florida, in the Bermudas, in the Bahamas, in Cuba, in the West India Islands and in the Sandwich Islands. The results of this trip show plainly that the theory of Darwin and Dana of the formation of atolls and of barrier reefs by subsidence is not applicable to the Fiji Islands, notwithstanding the boring at Funafuti by Prof. David of the University of Sydney. In all the localities that I have visited the coral reefs form but a thin crust upon the underlying base—it is not more than fifty or sixty feet thick in Florida—and the shape and slope of the base is in no way due to the growth of the corals living upon it.

There are in Fiji a number of small atolls from one to three or four miles in circumference, the formation of which, it seems to me, can only be satisfactorily explained on the theory that they have been formed upon the eroded summits or rims of extinct craters, the rim of the volcano having been eroded either to a continuous flat or to flats separated by deeper passages forming entrances to the inclosed lagoons. The great variety of causes which have been active in shaping the present physiognomy of the reefs and atolls of Fiji shows the impossibility of assigning any one factor, like subsidence for instance, as is done by Dana and Darwin, as the single cause for the formation of the many different kinds of atolls and barrier-reef islands to be found in the Fiji group.

### SUFFERING VANQUISHED

A NOVA SCOTIAN FARMER TELLS HOW HE REGAINED HEALTH.

Had Suffered from Acute Rheumatism and General Debility—Scarcely Able to Do the Lightest Work.

From the Acadien, Wolfville, N. S.

One of the most prosperous and intelligent farmers of the village of Greenwood, N. S., is Mr. Edward Manning. Anyone intimate with Mr. Manning knows him as a man of strong integrity and veracity, so that every confidence can be placed in the information which he gave a reporter of the Acadien, for publication the other day. During a very pleasant interview he gave the following statements of his severe suffering and recovery:—"Two years ago last September," said Mr. Manning, "I was taken with an acute attack of rheumatism. I had not been feeling well for some time previous to that date, having been troubled with sleeplessness and general debility. My constitution seemed completely run down. Beginning in the small of my back the pain soon passed into my hip, where it remained without intermission, and I became a terrible sufferer. All winter long I was scarcely able to do any work and I was only with the acuteness of suffering that I managed to hobble to the barn each day to do my chores. I appealed to medical men for help but they failed to bring any relief. At last I decided to try Dr. Williams' Pink Pills and with their use came a complete and lasting cure. I had not used quite three boxes when I began to feel decidedly better. I continued using them until twelve boxes had been consumed, when my complete recovery warranted me in discontinuing their use. I have never felt better than since that time. My health seems to have improved in every way. During the past summer I worked very hard but have felt no bad effects. The gratitude I feel to Dr. Williams' Pink Pills, none but those who have suffered as I have and been cured can appreciate.

An Analysis shows that Dr. Williams' Pink Pills contain in a condensed form all the elements necessary to give new life and richness to the blood and restore shattered nerves. They are an unfailing specific for such diseases as locomotor ataxia, partial paralysis, St. Vitus' dance, sciatica, neuralgia, rheumatism, nervous headaches, the after effects of la-

Ask your grocer for



For Table and Dairy, Purest and Best

grippe, palpitation of the heart, nerve prostration, all diseases depending upon vitiated humors in the blood, such as scrofula, chronic erysipelas etc. They are also a specific for troubles peculiar to females, such as suppressions, irregularities and all forms of weakness. They build up the blood and restore the glow of health to pale and shallow cheeks. In men they effect a radical cure in all cases arising from mental worry, overwork, over-excesses of whatever nature. Sold by all dealers or sent post paid at 50¢ a box or six boxes for \$2.50 by addressing the Dr. Williams' Medicine Co., Brockville, Ont.

### Thumblers.

William Carstairs, the Scotch divine who for fourteen years served William III, as confidential secretary and adviser-in-chief, had been implicated in the Rhy house Plot, a conspiracy to assassinate Charles II., and place Monmouth on the throne. He was put to the excruciating torture of the thumbknives, or thumbcrews, which he endured heroically, without confessing or implicating others.

After Carstairs became the private adviser of William he was presented with the instrument by which he had been tortured. The king, wishing to see the measure of fortitude necessary to endure the terrible torture, without making a confession of some sort, placed his thumbs in the machine and told Carstairs to turn the screw. He turned slowly and cautiously.

"It is unpleasant," said King William, "yet it might be endured. You are trifling with me; turn the screw so that I may really feel pain similar to that you felt."

Carstairs turned the screw sharply. The king cried out, and when released said that under such pain he would have confessed to anything, true or false.

### No Wonder.

The reprehensible practice of kissing babies, and thereby subjecting them to danger of contagion as well as to discomfort and annoyance, is so hard to suppress that one cannot greatly marvel at the means of combating the practice which a certain father is reported to have adopted.

"Why, I should like to know," a friend asked this prudent father, "have you taught your baby to eat onions?"

"It keeps people from kissing him," answered the father.

### UNCLAIMED MONEY.

We have the names of 800 persons who are advertised for to claim money—money left to each person mentioned, or it dead their heirs are wanted to make claim. Many of these persons came to Canada and now know nothing about it. There is no expense whatever in obtaining any of these legacies. Send stamp for new list.

McFARLANE & CO. Truro, N. S.

### CONDENSED ADVERTISEMENTS.

Announcements under this heading not exceeding five lines (about 35 words) cost 25 cents each insertion. Five cents extra for every additional line.

**A GENUINE FOUNTAIN PEN FOR 35c.** Intention hard rubber barrel with gold-point pen nib, satisfaction guaranteed. Postpaid 35 cents. BARNWICK NOVELTY CO., Boston, Mass.

**FREE** To any Lady sending us the names and addresses of five other ladies, we will send one box of our Extra Sanative Antiseptic Tablets worth \$1 by mail, prepaid—No Latin can afford to be without them. LITTLE'S REMEDY CO., 100 North Building, Dayton, Ohio.

**FREE!** 75 Complete Stories! Pleasant, good words, and a big idea. Picture Book that will surely put you on the road to a handsome fortune. Send five silver to pay postage.

**A GOOD ACTIVE AGENT WANTED** in every locality to introduce our "Millionaire" Plan. Six months for the right man on salary or commission. Only those who mean business need apply. CLARK & BROWN, Sole Agents for the Maritime Provinces, Bloomfield, Kings County, N. B.

**WANTED** By an Old Established House—High Grade Man or Woman, good Church standing, willing to learn our business then to act as Manager and State Correspondent here. Salary \$600. Enclose self-addressed stamped envelope to A. T. Elder, Manager, 278 Michigan Ave., Chicago, Ill.

**STAMPS** COLLECTIONS and old stamps bought for cash. State size of collection or send list. For particulars address Box 355 St. John, N. B.

**FOR SALE** A VALUABLE PROPERTY in the growing town of Berwick, N. S., known as "Brown's dock" and contains three acres all rented, also two tenements which can be easily converted into a Hotel. Orchard and a stable in rear. Berwick is a noted health resort and is one of the most growing and prosperous towns in Nova Scotia. There is an excellent opening here for a Hotel. Terms \$400 down remainder on mortgage. Would exchange for good farming property. Apply to H. E. Jefferson or W. V. Brown, Berwick, Nova Scotia.

**RESIDENCE** at Rothsay for sale or to rent for the Summer months. That pleasantly situated house known as the "Tins" property about one and a half miles from Rothsay Station and within two minutes walk of the Kennebec Falls. Rent reasonable. Apply to H. G. Fenerty, Barrister-at-Law, Fuzsley Building. 24 6-11

### "WHOS EVER HATH, TO HIM SHALL BE GIVEN."

That is Scripture, and its truthfulness is verified by every-day experience. It is as true of those having a thorough business training as of those holding any other position. This is proved by the fact that our graduates hold almost every leading position in Saint John, and comprise a large percentage of our most capable business men.

TWENTY (20) Students already (March 20th) in good situations this year.

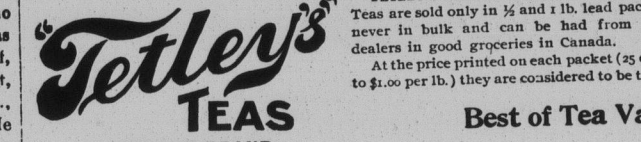
Catalogues of our Business Course and of the Isaac Pitman Short-hand mailed to any address.

S. KERR & SON,

## For 10 cents

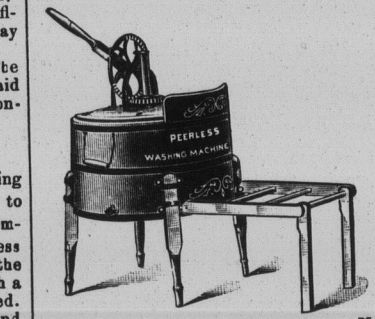
in cash or stamps, we will mail you, all charges prepaid, a handsome metal box, size 5 1/4 inches long, 3 1/2 inches wide and 1 inch deep, filled with TETLEY'S ELEPHANT BRAND INDO-CYVLON TEA, 50 cents per lb. quality. The box alone is worth the money—the Tea it contains is worth more than the money.

It's offered as an inducement to make you acquainted with the delicious Elephant Brand Teas, and incidentally to see where our advertising is best read—and so kindly mention the paper.



Best of Tea Values. JOSEPH TETLEY & CO. 14 LEMOINE STREET. MONTREAL

## Washing Machines..



We illustrate the "Peerless" combining washer, Tub and stand in one price \$5.50. We also have "Burlington" at \$5.00. The "Duplex" at 50 cents.

### —ALSO—

the "Willett" the good qualities of which are too well known to need any comment.

Our entire store is filled with interesting house furnishing goods all marked in plain figures at low prices.

Brushes of every description. Tops self-wringing at 40c. Tubs all sizes wood and indurated. Scauldners 50 cents upwards. Wringers the largest and best assortment in the city. Prices range from \$2.00 up.

## EMERSON & FISHER. 75 Prince Wm. Street

NOW WE HAVE IT!

## FREE GLEASON'S HORSE BOOK

The Only Complete Authorized Work by America's KING OF HORSE TRAINERS, PROFESSOR OSCAR R. GLEASON.

Renowned throughout America and recognized by the United States Government as the most expert and successful horseman of the age, The Whole Work, comprising History, Breeding, Training, Breaking, Buying, Feeding, Grooming, Shoeing, Doctoring, Telling Age, and General Care of the Horse.



416 Octavo Pages. 173 Striking Illustrations! Produced under the direction of the U. S. Government Veterinary Surgeon. In this book Prof. Gleason has given to the world for the first time his most wonderful methods of training and treating horses.

10,000 SOLD AT \$3.00 EACH.

But we have arranged to supply a limited number of copies to our subscribers ABSOLUTELY FREE. First come, First served.

OUR Offer

Regardless of the fact that thousands upon thousands of these books have been sold at \$3.00 each, we have by a lucky hit arranged to send you a limited period send a copy free, post paid, together with The Progress for one year, on receipt of \$2.00 the regular yearly subscription rate. Old subscribers can also receive a copy of the book by sending \$2.00 and have their subscription advanced one year.