[illegible] proceeded to prepare each into a well shaped [illegible] from which the cutting was taken. [illegible] Von Marenzeller's report as to the [illegible] of taking the cuttings, and as to the best [illegible] also as to the time of year in which they should and other important conditions. It [illegible] that *a* small cutting 20 cubic millimetres [illegible] of moderate table size would be prepared out seven years growth. Whilst the [illegible] the Austrian Government demonstrate [illegible] of Professor Oscar Schmidt's invention, [illegible] of which the cultivation was attempted [illegible] to put a stop to the [illegible]. First, the native population, more especially [illegible] Indian at objection to these experiments [illegible] that they might lead to the injury of the sponge [illegible] consequently they persistently destroyed and [illegible] the experimental sponge bed. It was necessary that the sponge cuttings on their supports should [illegible] in an open unprotected bay in order to [illegible] the requisite condition of the sea water and [illegible] of the sponge and at the same time the [illegible] of protecting the bay during a long series of [illegible] and the depredations of the fishermen would [illegible] very great and incommensurate with the [illegible] to be obtained by the sale of the sponges when [illegible]. The hostility of the population of the [illegible] coast was then the chief cause of the abandonment of the experiments. But, further, the slow growth of the sponges (first established as a fact by these experiments), and the expense of obtaining the sponges, and of making and sinking the supports, [illegible] to show with considerable clearness that the [illegible] to be obtained by such a system of cultivation would be extremely small. It appears that the actual weight of sponge produced in a given time is not increased by the plan of dividing a live sponge into many separate pieces, the undivided sponge would have increased by the same amount as that by which the whole series of separate pieces have increased in the same time, and inasmuch as a large sponge is more valuable commercially than an equal weight of small ones, the utility of the operation of taking cuttings is very doubtful. It could only be of service for the purpose of diffusing sponges over a wider area of the sea bottom than that over which they would naturally spread. If such a diffusion could be effected, the sponge might be introduced to new and unoccupied ground and thus obtain increased facilities for nutrition and a better chance of falling upon one of those favorable situations which cause the sponge to grow a good size; but the situations suitable to the healthy growth of sponges appear to be (so far as our knowledge goes) already fully tenanted by sponges which multiply and diffuse themselves naturally by means of eggs which give rise to minute swimming germs, these germs after a time fixing themselves and developing by slow growth into sponges like those which produced the eggs. It may be possible by means of the system of sponge cutting, proposed by Professor Oscar Schmidt, to introduce sponges into new situations previously unoccupied; and experiments in this direction, though requiring great skill and knowledge of the conditions favorable to sponge growth, would be worth trying. Excepting with this object the method of sponge cutting does not seem to be one of much promise. In relation merely to the management of an existing sponge fishery, I am of opinion that all that can be done by official control is to prevent the contamination or unnatural disturbance of the waters and bottom where the sponges grow; and, secondly, to strictly enforce a limitation of size in regard to those sponges which are fished and sold. Only large sponge should be moved from the sea bottom for the market, and all smaller and incompletely grown specimens should be returned to the waters by the fishermen immediately when taken. Further, the ground on which the sponges grow should not be too often dredged, but only at certain intervals in the year. In making these recommendations I am supported by the opinion of Professor Schulze, who has during the last six years devoted himself to the study of the life history of the Adriatic sponges, and has added many most important facts to our knowledge of these animals. Whilst these are the counsels which our present knowledge of the subject justifies, it must be distinctly understood that further experiment in the matter is to be desired, and might be crowned with a practical success. It may be possible to construct artificial basins (of large size, some hundreds of yards in area), in which the water shall be of proper depth, temperature, and purity for the growth of the commercial sponge, and such basins might be stocked with sponges, by the use of the 'method of cutting.' No experiments with artificial basins have as yet been carried out."

AN ARITHMETICAL PRODIGY

Arithmetic is usually the greatest trial of most children's school life. We can all appreciate, therefore, the wonderful doings of the little boy mentioned in the following extract:—

Among calculating boys a prominent, though perhaps not the most prominent place, must be accorded to Zerah Colburn, who was born in America in 1804 and died in 1839. He has left an autography behind him, from which we learn that it was when he was about one month under six years of age that the very remarkable gift with which he was endowed first attracted attention. His father was employed at a pewter's work bench, and little Zerah was playing among the chips on the floor, when he began to say to himself, '5 times 7 are 35, 6 times 8 are 48,' and so on. His father's attention was arrested, and he laid down his work to question the little fellow, who had only about six weeks' schooling. Mr. Colburn at first thought the child had picked up a little of the multiplication table by memory from hearing other children repeat it. The more he questioned, however, the more astonished he became, for the little one knew the multiplication table as usually taught quite perfectly, and when going beyond this, his father asked him to multiply 13 by 97, he answered instantly 1,261. Neighbors came and questions were propounded by one and another, always increasing in difficulty, and always with the same astonishing result. He very shortly was found capable of performing by mental process alone calculations which perhaps many lads of twice his age would find laborious with the aid of slate and pencil. How many seconds are there in 2,000 years? somebody asked this child of six years of age. Almost immediately he answered 63,072,000,000. Allowing that a clock strikes 150 times in one day, how many times would it strike in 2,000 years? was another question, and with equal promptitude he replied 113,880,000 times. He was asked how many days and hours had elapsed since the commencement of the Christian era, and in twenty seconds he gave the correct answer. A more astonishing feat to all appearance was the extraction of the square root of 998,001. Any arithmetic will give a rule by which such a problem may be worked out, but the astonishing thing was that little Colburn knew nothing about rules in books, for he had never learned to read. Up to the tenth power he could raise single figures with astonishing facility, and numbers of two figures, such as 26, he could bring up to the sixth, seventh, or eighth power, though sometimes with a little difficulty. After a time he was able not only to extract the square root of a number, but the cube root. The che was asked to give the cube root of 268,435,456, and almost before an ordinary calculator could have written down the figures he answered 646, that being the number which multiplied into twice over will give the above nine figures. Zerah's fame drew upon him some very queer problems indeed for solution. One old lady came to request that he would calculate what had become of her silver spoons which somebody had stolen twenty years ago. This it will readily be believed was a poser, and the calculating boy had to confess that he could not work out that sum. After extensive travelling in his own country, young Colburn was taken to England, where he was seen and examined by many eminent persons, and where he performed many prodigious feats of mental reckoning. The Duke of Cambridge asked how many seconds had elapsed since the commencement of the Christian era. Promptly and correctly the boy answered. What his answer was we leave our readers to work out at their leisure. It was hoped that the mature intellect of this remarkable individual would have proved something quite out of the common way. At one time he was put to school at the expense of a nobleman. All such hopes were disappointed, however. At the age of somewhere about twenty he entirely lost his special endowment, and went back to his own country, like Samson, shorn of his locks.'

THE PRODUCTS OF FIJI.

When in October 1874 the sovereignty of the 225 islands forming the archipelago of Fiji was ceded to the British Crown, doubts were, in some quarters, rather freely expressed with regard to the policy of the Government in accepting the offer of King Cacobau. These doubts took the form customary to English critics in treating of lands in the far South which they have never visited. The climate was stated to be injurious to the health of Europeans, the land to be unproductive of aught but tropical jungle and sea-island cotton, for which the demand had died out, the native inhabitants to be, not only warlike and bitterly opposed to white settlers, but notorious cannibals. However, those who were so loud in their predictions of evil in store for any who ventured life or money in Fiji found no converts to their views amongst those of the Queen's subjects who were most interested in the young Colony—the inhabitants of New South Wales, Victoria, and New Zealand. Many of the leading spirits in Australia and New Zealand had thoroughly satisfied themselves of the advisability, political as well as civil, of acquiring possession of the group, and were not slow to move directly the Deed of Cession had been executed. The young colony, however, commenced its career under the most unfavorable circumstances. The epidemic of measles, unfortunately introduced into the islands on the return of the king and his two sons from a visit to Sydney, carried off, it was reckoned, some 70,000 of the native population, and the trade of the group suffered materially owing to want of labor. Sir Arthur Gordon, too, on assuming the Governorship, had to undo much that had been done towards the close of the reign of King Cacobau. Settlers, however, found their chief difficulty in obtaining a title to the land they were desirous of purchasing, owing the conflicting claims set up by numerous natives, each professing himself to be owner in fee. They were unable to obtain Crown grants, and the Government appeared dilatory in dealing with the question of land tenure in any way whatever, nor, indeed, to the present day, has this question been satisfactorily adjusted. Commercial matters were further complicated by the announcement that Suva, and not Levuka, was to be made the capital of the colony—a step naturally opposed by many long-standing interests. Difficulties much of the same nature must always arise in connection with the creation of a new colony; and, taking into consideration its isolated position, and the fact that it is the veritable antipodes to the Mother Country, they may be judged in this case to have been fairly met and overcome. Fiji may now be said to be making rapid progress. The number of capitalists located in the islands is as yet but small, but during the last four years a large amount of money has been furnished by merchants and speculators in Victoria and New South Wales, who, knowing well the resources of the group, have come to the conclusion that certain industries will give them a highly satisfactory return for their outlay. It must be borne in mind that the natives are mere tillers of the soil, and not exporters of produce or manufacturers for export, except as being the paid laborers of the white settlers, who have the entire export trade in their hands. Statistics recently published show clearly the value of the islands from an agricultural point of view; and, as is admitted by the late Governor and by all who have any practical acquaintance with the colony, the development of its resources is as yet quite in its infancy. Fiji was first brought before the notice of traders by the exquisite fineness of its "sea-island" cotton, and for some years the early settlers were well rewarded for their enterprise at the uttermost end of the world. But prices fell in London markets, and, although there is still a fair demand for Fiji cotton in France, it is admitted by planters that this industry has seen its best day. There are, however, still some 2,400 acres under cotton, but it is very doubtful whether this area will ever be extended. In 1875 the export value was 28,700*l*; in 1876, 21,100*l*, in 1877, 15,700*l*, thus showing, so far, a steady decrease, but in 1878 there was an increase of 5,000*l*, the value being 20,700*l*. The statistics for 1879 are not before us, but we believe that they show a falling off in respect of this article of export. Contemporaneously with the fall in favor of cotton came the rise of copra, which is now by far the chief article of export from the islands. Copra is the dried kernel of the cocoanut, and is mainly used for the manufacture of cocoanut oil, which forms perhaps the very best of lubricants. Everywhere in the island, with the exception of Viti Levu, the cocoanut palm grows luxuriantly, and the appearance of the islands from the sea, with the groves of palms stretching for miles along the coast line, their graceful fronds waving directly over the pellucid light green waters of the lagoon, is very striking to a visitor. Each palm, when in full bearing, produces about 100 nuts a year, and an acre of ground will carry about 80 palms. About 10,000 nuts suffice for the manufacture of a ton of copra, worth 14*l*, and rather more than a ton of fibre, worth about 15*l*, so that an acre of palms at their prime should give a return of about 25*l* per annum. As yet, however, most of the fibre is wasted owing to the want of proper machinery for its manipulation, and it is reckoned that 50,000*l* a year is thus thrown away in the group. The value of the copra exported in 1875 was 10,000*l*, in 1876, 90,000*l*, in 1877 it had risen to 70,000*l*, and in 1878 to 122,000*l*, so that this, at present the staple product of the colony has trebled its exported value in four years. The fibre exported in 1876 was valued at 4,700*l*, and in 1878 it had risen to 6,000*l* only. The cocoanut palm does not thrive in Viti Levu, the largest island in the group owing to the ravages of a small insect, as stated by Mr. Stone-lower Cooper, whose recent *Coral Land* is the most valuable work on South Sea Islands that has been published for some years. To the statistics contained in his book we are indebted for much of the information of this article. When cotton showed symptoms of decline as an industry, the planters transferred their attention to sugar-cane, and to some purpose, as is evidenced by the fact that the value exported has steadily risen from 3,100*l* in 1875, to 18,000*l* in 1878. Those who are best acquainted with the group assert without fear of contradiction that Fiji, in respect of sugar producing, is destined to be the Mauritius of the South Pacific, both soil and and climate being admirably suited to the rapid growth and complete development of the cane. At present sugar-growing is quite in its infancy; the canes are cut all the year round instead of the proper season at the end of the hot weather, mechanical contrivances for tilling the soil and crushing the cane are but little used, and the land is not renovated after a cutting as it should be. There are some two thousand acres now under cane, but this area will be largely increased yearly. Mr. Cooper estimates that the produce per acre should be about two and a half tons, and that with proper machinery a large estate well worked should make an annual profit of 50 per cent. on the expenditure. Very excellent coffee has already been produced in small quantities, and both climate and soil are well adapted for the growth of the shrub in many parts of the islands, though only twelve hundred acres were under coffee in 1878. Very wisely the Government has done its best to further this industry, having sent large quantities of seed into the interior of Viti Levu, to enable the natives to form coffee gardens. As far as can be judged, too, cocoa would do well in the islands, and the young cacao trees that have been planted are reported as thriving. Tea and chinchona might also be grown in several inland districts, and tobacco grows admirably, but as yet planters have not sufficient knowledge to enable them to manufacture it to advantage. There would be, too, in New Zealand and Australia a ready market for any quantity of tropical fruit, such as oranges, lemons, bananas, pineapples and mangoes, which would stand the seven or eight days' voyage, and there is no apparent reason why spices, such as cinnamon, nutmeg, cloves and pepper, should not do well in the group, provided science and experience were brought to bear in their cultivation. In fact, Fiji, both in the matter of climate and soil, is marvellously adapted for the growth of nearly every tree, shrub and plant of commercial value which are favored by the heats and rains of the tropics, and that in our new colony there is a grand opening for hard-working planters with a certain amount of capital is acknowledged by all who have visited the islands. Of the other exports, maize has apparently declined in favor, for, whereas the value exported in 1875 exceeded 11,000*l*, in 1877 it did not reach 8,000*l*, and in 1878 had fallen below 7,000*l*. Probably sugar growing having proved so profitable will to a great extent account for this. The annual value of bêche-de-mer—the sea-slug which is dried and exported to China—is about 3,200*l*, but this is not an item of export which affects the prospects of intending colonists. Candlenuts to the value of over 3,500*l* were sent beyond seas in 1878, this being an article which shows signs of advancing as an export. The same remark applies to green fruit, of which over 2,000*l* worth was exported in 1878, to molasses, 1,400*l*, and to wool, which had advanced from 101*l* in 1875 to over 1,600*l* three years later. These, then, are the principal products of the Fiji Islands. The statistics we have quoted have been obtained from reliable sources, and go far to prove that the colony is admirably adapted in nearly every respect to the growth of tropical produce. Taking into consideration the proximity of a large market in Australia and New Zealand, it is not to be wondered at that those who know Fiji say boldly that in a few years' time it will fairly have earned the proud title of the "West Indies of the Pacific."

EXPLORATIONS IN NORTHERN AUSTRALIA

The recent additions to our knowledge of the exact physical conditions and capabilities of the hitherto neglected northern parts of Australia supplied by the explorations of Mr. Alexander Forrest by land, are now being extended by sea. Mr. H. M. Chester, the magistrate at Thursday Island, Endeavor Strait (west of Somerset), has forwarded to the Colonial Secretary, Brisbane, an interesting report by Captain C. Pennefather upon his exploration of the Coen, Archer, and Batavia rivers on the east side of the Gulf of Carpentaria, of which nothing was known beyond their mouths—thus considerably increasing the material requisite for forming an opinion upon the nature of the country on the western side of the Cape York Peninsula. Mr. Chester trusts that it may have the effect of inducing settlement in this hitherto unknown portion of Queensland. Captain Pennefather, in the Queensland Government schooner *Pearl*, sailed on June 18 last from Thursday Island, in pursuance of instructions, to examine the eastern side of the Gulf of Carpentaria. Steering southward along the coast, where it was barren and sandy, though apparently thickly timbered inland, he arrived at the mouth of the Coen, which was too narrow and shallow for anything but boats to pass. Some hundreds of natives were seen at the entrance, who, though they had apparently never seen white men before, did not attempt to molest the party, and evinced no fear; they were on the contrary friendly, and accepted presents of beads, fish-hooks, etc. This supposed river was explored in boats for six miles, and apparently then ended in mud banks and mangrove swamps with open forest behind; it is evidently only a salt water inlet. Numbers of alligators and flocks of ducks of different kinds were seen. Sailing further south, along a thickly inhabited coast, mostly low, but with red cliffs at two points, and after meeting four very frail bark canoes with no outriggers, manned by strong well made natives, who gave the explorers fresh caught fish and turtle, the mouth of the Archer was reached on June 23. This river discharges a large quantity of water, making the sea thick and muddy for some distance out; it has a shoal some three or four miles from its mouth, which would not allow a draught of more than eight or ten feet. The mouth itself is only 500 yards wide for three-quarters of a mile, after which it has a width of two miles for about the first six miles of its course. Here it runs through an open well-grassed plain, extending for some miles and ending in open forest country. Game of all descriptions was very plentiful. An island here divides the main stream into two, one branch trending up into a [illegible] to the south. An armed exploring party went up the more eastern branch for four miles further, making altogether for 30 miles, and adopted five fathoms, the banks were rather timbered with mangroves or close to the water edge, with plains extending beyond as before. No natives were seen, though in some apparently auspicious spots fires were lighted. The boat was evidently twice followed up and was eventually attacked by a party of natives when anchored in mid-stream at night. The attack was however, easily repelled. Proceeding further up the river with daylight, the country improved, mangroves no longer showed on the banks, but were replaced by rich tropical foliage, shady, with little level sward, and luxuriant forming the timber behind. Having come fifteen miles up stream, and finding no indication of a change, the party turned back, as they were met by the tide. The river at this point was still 300 yards wide, with seven fathoms from bank to bank. Very clear freshwater lagoons were found, the country was well grassed, and game plentiful. The ship was soon reached in safety, but future visitors are warned against the hostility of the blacks. The schooner was now turned to the northward, and on June 27 reached the mouth of the Batavia river (further north than the Coen). Here a sufficiently good and wide channel was found for the *Pearl* to be taken up stream for three miles, anchoring in five fathoms. The mouth itself was ten fathoms, and two miles wide, and the anchoring place five miles wide. Many natives were found on the south side, they were friendly, pleased with small presents, and helped the men to carry firewood into the boat, though they had not had any communication with whites before. Besides bark canoes, they have large outriggers cut out of trees. On further ascending this river, it was found to maintain a width of four to five miles and an average depth of five fathoms for six miles up, with high banks and fresh water springs on the right; the country here is open, having plenty of grass and timber. It then divides into south-east branches, the latter wide but shoal. The southern was found to be the main spring, deepening to ten fathoms after eleven miles, on which point the tide turned. The right banks were high, the country open, well grassed and timbered (blood-wood and stringy bark being very lofty and straight), and the loamy soil apparently good. A mob of blacks with spears here stalked the party in the long grass; they were of a different type to the natives at the mouth, large, tall, strapping fellows of a copper-color and talking another language. A distrustful attempt at conversation with some of these men was all that occurred. On the tide slackening, further progress up stream was made, and the boat was anchored in midstream in five fathoms, the river being about 500 yards wide. No disturbance during the night happened. Starting early next morning through open, well-grassed plains on both sides, a final distance of 36 miles was reached before the party returned, without any further meeting with the aborigines, though some fires were seen. The banks became higher as the river was ascended, clothed with shrubs and perfectly straight and lofty timber, of which fine spars could be cut. The soil in the scrub was very rich, and well irrigated by small running streams. Handsome palms grew at the edge of the water, here perfectly fresh and sweet, and the stream widened into broad shallow reaches, with islands in the centre, forming altogether an attractive scene. Alligators seemed very numerous, though not affecting the fresh-water part of the river; ducks were plentiful, and some enormous cat-fish, weighing as much as 30 lbs., were caught. So far as actually seen, the river was a very fine one; and, should that part of the country be opened up, Capt. Pennefather thinks its mouth would make a splendid port in which vessels could lie in smooth water, whilst those of small draught could actually ascend it for 25 miles. But few reports of this kind come to hand from Australia. Explorers' accounts usually contain so much painful detail of arid plains, spinifex and drought, that Captain Pennefather's abundance of sweet water, huge cat-fish, palms, wild duck, open forest, and grassy plains gain an additional charm by the contrast.

EXERCISE AND TEMPERATURE.

These have been made the subject of a series of observations (about 150 in number, extending over four years) by M. Bonnal. He finds that all muscular exercise raises the rectal temperature. The rise is not, however, in direct relation either to the duration of the exercise or the apparent fatigue. For a given exercise, performed under like conditions, the rise of temperature may vary in different individuals, and even in the same individual. The altitude, the state of the atmosphere, the energy of the movement, the nature and amount of clothing, have a very manifest influence, especially on the rapidity of the rise. Absence or abundance of perspiration has no appreciable influence. The rectal temperature is rarely elevated beyond 38·6° C., but in one case, that of a runner who, on the 14th November, ran about 18 kilometres in an hour and a half without stopping, M. Bonnal found it 39·5. (This man showed no accelerated respiration, but merely an increase of pulse to 145 beats.) In rest after exercise the rectal temperature falls, and the more rapidly the shorter the exercise has been. It is noted that all rapid exercise diminishes the peripheric temperature (in the mouth, armpit, or groin), which, on the other hand, rises again directly rest is taken, and after some time the peripheric and rectal temperatures come to their normal difference, 0·2° or 0·3°. If the rectal temperature be over 37°, a moderate exercise (such as walking 20 minutes on level ground) only raises it 0·2° to 0·4°; but if under 37°, the rise may be more. In rapid ascent it is always after the first half hour that the rectal temperature is most raised, it may then remain stationary, or rise, or even descend a few tenths of a degree. Gymnastic exercises in the horizontal position, and limited to the upper limbs, does not alter the initial temperature. If limited to the lower limbs it may, in 30 minutes, raise the rectal temperature 0·3° to 0·7°. In general, a rigorous application of the laws of mechanics to the human organism is not justified.

COLD PROCESS FOR ZINCING IRON.

The metal is first cleaned by being placed in a bath made up of water, 1,000 litres, chlohydric acid, 550 litres, sulphuric acid, 50 litres; glycerine, 20 litres. On being removed from this bath the metal is placed in a bath containing 10 per cent. of carbonate of potassa, and is next transferred to a metallizing bath, consisting of water, 1,000 litres, chloride of tin, 5 kilos; chloride of zinc, 4 kilos; bitartrate of potassa, 8 kilos; acid sulphate of alumina, 4 kilos, chloride of aluminum, 10 kilos. The metal is to be left in this mixture for from three to twelve hours, according to the thickness of the layer of zinc to be desired.