Chinese cities. Wherever he had an opportunity of walking diametrically across lengthy curves of the river he found the inclosed area to be extremely well cultivated; though not so flat, its general appearance recalled many features of the Tonquin delta, especially in its great wealth of Bamboos. The productions of the soil are much the same, the papaw, areca-palm, sweet potato, turnip, ground-nut, orange-tree, etc.; but a peculiar Hainan feature is the cocoa-nut palm. Another peculiarity of this region is the ubiquitousness of the dwarf *Pandanus*, probably the same as the *P. odoratissima* of Fiji, the fibre of which is used in the manufacture of grass-cloth, and is usually known to foreign trade here as hemp. Much of the land was under sweet potato cultivation, and every household seemed to possess a few pigs, of the very superior and stereotyped Hainan variety, black as to the upper and white as to the lower part of the body, with a dividing line of gray running along the side from the snout to the tail. These wholesome-looking pigs are fattened on the sweet potato, and do not rely for sustenance upon precarious scavengering, as is the case with the repulsive and uncleanly animals of North China. Land contiguous to the river is irrigated by enormous wheels, forty feet in diameter, of very ingenious construction, moved by the current, needing no attention, and discharging perhaps one hundred gallons of water in a minute into the trough above, day and night without intermission. He passed several large pottery establishments; but, as at the New Year all business and cultivation are suspended for a few days, the opportunity was not a very good one for gathering precise information. The temperature during the week ranged between 50° and 60° F. Game seemed plentiful everywhere, and he mentions that a German resident has recently made a very fine collection of about 400 Hainan birds, embracing 154 species, which will shortly be on their way to a Berlin museum. One of the commonest birds in the river is a spotted white and black kingfisher of large size. Amongst the trees which attracted his attention was one locally called the "great-leaved banyan," which looks remarkably like the gutta-percha tree: the natives seem to use its gum mixed with gambier, in order to make that dye "fast;" but there is some doubt whether it is not the sap of the real banyan-tree which is used for the purpose. A very strong silk is made from the grub called the "celestial silk-worm," or, locally, "paddy-insect." This grub is found on a sort of maple. When full-grown it is thrown into boiling vinegar, on which the "head" of the gut, or "silk," appears; this is sharply torn out with both hands, drawn apart, and is as long as the space between them, say five feet; it is so strong that one single thread of it is sufficient to make a line with which to catch the smaller kinds of fish.

SERICULTURE IN ASIA MINOR.[1]

IN May, 1885, the writer was enabled, from personal observation on the spot, to report upon the silk harvest of Bournabat, near Smyrna, Asia Minor, which report was printed in the *Journal* (Vol. XXXIII. p. 852). The sericultural industry was then in a state of slow revival from a condition of almost utter collapse, caused by the deadly effects of the various silkworm diseases which had long devastated, and nearly ruined, the "magnaneries" of France and Italy. Subsequently, in 1887, in an extended and illustrated form, the report was reproduced, with additional sericultural and other information, in the volume entitled "Pen and Pencil in Asia Minor," published by Sampson Low & Co. On both these occasions the writer endeavored to interest the public in the story of an effort, on the part of an English gentleman, to benefit the Turkish peasantry and revenue of the country, which had more of the romantic element in it than is usually to be found in ordinary industrial operations. For nearly half a century Mr. John Griffitt of Bournabat, a village near Smyrna, has devoted most of his leisure hours, well seconded by his accomplished Greek wife, to combatting the maladies of silkworms, experimenting with the various known races, and endeavoring to improve the quantity and quality of their silken produce. Long before M. Pasteur, the distinguished French physiologist, took the field, Mr. Griffitt had been working at the same problems, the solution of which brought the great Frenchman afterwards so much well-deserved honor; but while the one was rewarded the other has hitherto been neglected. The first enjoyed the wealth and influence of his Government to encourage him in all his efforts; the second has had to struggle on unaided throughout his long career of philanthropic endeavor against the inertia of sluggish or hostile officials, the childishness of a prejudiced peasantry, and a horde of unscrupulous native and foreign parasites, ever ready to appropriate his methods without acknowledgment, to claim or dispute his discoveries, and to defraud him in every possible way. From the first, Mr. Griffitt welcomed and applauded the remarkable results of M. Pasteur's investigations, and became his acknowledged disciple; but, being himself a practical silk-farmer, which M. Pasteur was not, was soon in a position to shoot ahead of his master, to modify, supplement, and stamp with his own genius many of the suggestions of the great chemist, for which he never received either credit or reward. Probably in no other country in the world except Turkey could a native, or even a foreigner, accomplishing the revival of a staple industry, as Mr. Griffitt has done, have escaped recognition, or being loaded with honors. He has rescued sericulture, upon which so many thousands, perhaps millions, depend in Turkey, from extinction, and been a means of replenishing the usually collapsed Ottoman exchequer, and enabling the Porte to offer British bond-holders — if it chooses to do so — substantial dividends instead of polite excuses.

Still more recently the writer had a paper in the *Journal* of Aug. 23, 1889 (Vol. XXXVII. p. 772), when further information was given regarding Mr. Griffitt's continued successes, particularly in open-air sericulture. On the present occasion he would add the latest facts, which are quite as interesting as those already communicated.

At the beginning of 1891 a report by the "Chambre des Deputés" was presented to the French Government, in which it was said that sericulture was not progressing in France in consequence of the reappearance of the dreaded disease known as "flacherie," along with some minor maladies, and that the nurseries were being decimated. M. Pasteur's discoveries had enabled the silk-farmers to vanquish the other distemper, "pebrine," but "flacherie" was working havoc everywhere, so a grant of several millions of francs was asked to be expended in trying to crush the disorder.

Meanwhile, Mr. John Griffitt, with no Government money or help of any kind, had thoughtfully built up a system of scientific silk farming at Bournabat, near Smyrna, in which he combined the most notable of M. Pasteur's discoveries with the invigorating method of M. Roland of Switzerland, and his own experiences, with the result that his worms acquired such robustness that he had had no deaths among

[1] From the Journal of the Society of Arts.

them for years, while all the races subjected to the process yielded a larger crop of better silk than before. So marked was this improvement that a comparison will show it at a glance. In the first report, already alluded to, made in 1885, Mr. Griffitt's yield of cocoons — considered a splendid return at the time — was 78 kilogrammes (171 pounds avoirdupois) per ounce of eggs set to hatch, while in 1890 the harvest was 91 kilogrammes (200 pounds) per ounce of eggs. These figures have been vouched for by M. E. Charmand, chief of the Smyrna branch of the "Direction Générale de l'Administration de la Dette Publique Ottomane, à Constantinople," who reported his observations, gathered from time to time in Mr. Griffitt's factory at Bournabat, to his superiors at the Turkish capital.

Following up these efforts, and stimulated by the ill-success of the French sericulturists, Mr. Griffitt last year achieved an additional triumph, his latest crop showing an advance to 92 kilogrammes (202 pounds) of cocoons per ounce of eggs. This harvest had likewise been watched through all its stages, and reported upon to the Constantinople authorities by the same gentleman already named, who added that as the yield from foreign eggs had been *nil* at Bournabat, their importation into Turkey ought to be stopped.

It will be evident to the readers of the above and former communications that Mr. John Griffitt's single-handed and almost phenomenal success in sericulture, in the face of the utter failure of the best silk-farmers of France, point to Bournabat as the future sericultural school of the world, and as the *entrepot* for robust graine. If further figures be required, they are to be found in the circumstance that during the last four or five years the finest French eggs hatched at Bournabat have only yielded from 10 to 12 kilogrammes (22 to 26 pounds) of cocoons per ounce, as compared with Mr. Griffitt's 92 kilogrammes (202 pounds) per ounce of eggs; while last season, according to M. Charmand, the French eggs laid out at Bournabat did not hatch at all.

WILLIAM COCHRAN.

Overdale, Dunblane, Perthshire.

MR. KOEBELE'S SECOND TRIP TO AUSTRALIA.[1]

WE have not yet mentioned in these pages the fact that Mr. Koebele has been sent out to Australia and New Zealand a second time on a search for beneficial insects. The California State Legislature last winter appropriated $5,000 for sending some one to Australia for this purpose, and this sum was placed at the disposal of the State Board of Horticulture. The board soon afterward made application to the Secretary of Agriculture to have Mr. Koebele sent, placing the entire appropriation at the secretary's disposal. To this proposition the secretary assented on condition that Mr. Koebele should go under instructions from the department, his salary as an agent of the division of entomology being continued (his expenses only to be paid by the State Board of Horticulture), and that his report should be made to the Department of Agriculture, the desire being to co-operate as far as possible with the board. Accordingly, such instructions were given as seemed best to promote the object in view, cautioning Mr. Koebele particularly to run no risk, in his sendings from Australia, of importing with the beneficial insects any injurious species not now existing in the United States which it might prove disastrous to introduce, and taking advantage of the occasion also to have him make every effort to collect in California certain beneficial species to take with him to Australasia, indicating such species as prey upon cosmopolitan insects or species which the colonies mentioned have derived from America.

Mr. Koebele sailed on the August steamer, stopping at Honolulu and Auckland, and arriving at Sydney the latter part of October. At Honolulu he left a number of living specimens of *Chilocorus bivulnerus* in the hands of our correspondent, Mr. A. Jaeger, and secured while there four species of lady-birds, of which he sent small numbers to California by steamer. These were sent for use against the black scale (*Lecanium oleæ*). He also found a few parasitic Chalcididæ on an undetermined Lecanium, and of these he also sent a few specimens. Upon his arrival in New Zealand some of the lady-birds which he had taken with him were alive and began to feed at once upon woolly aphis. Some syrphus flies and lace-wing flies were also in good condition, as were also the larvæ of the Rhaphidia, which feeds upon the codling moth. These were left in competent charge. Specimens of *Scymnus acceptus*, *S. consor*, *S. villosus*, *S. flavihirtus*, and *S. fagus* were collected and sent to California. These all prey upon various species of scale-insects, but it is hardly to be supposed that they will accomplish any better results in California than do our native species of this genus, all of which have a similar habit.

The most encouraging information comes to us under date of Nov. 1 from Sydney. He there finds that *Orcus chalybeus*, a steel-blue lady-bird, is a most important enemy of the red scale. He has found them by the hundreds, and has observed the mature insects eating the scales. All of the trees were "full of eggs," and the larvæ were swarming upon all the orange and lemon trees infested with the red scale. He secured and sent a large lot of the eggs and many of the adult beetles. He also sent the allied *Orcus australasiæ*, also found feeding upon the red scale, and a number of scymnids, one of which was very numerous, feeding upon the same scale-insect. Another species was found feeding mainly upon the flat scale (*Lecanium hesperidum*) and the black scale (*Lecanium oleæ*). He also forwarded a number of *Leis conformis*, which, as stated in Bulletin No. 21 of this division, is the commonest enemy of the woolly root-louse of the apple. Unfortunately Mr. Koebele does not state whether the three insects mentioned as feeding upon the red scale were successful in holding that destructive insect in check, and upon this point naturally depends much of their value to California. Our agent at Los Angeles, Mr. D. W. Coquillett, has been instructed to spare no pains to properly care for and colonize whatever may be received from Mr. Koebele, and is fully prepared to do so. This large sending arrived at Los Angeles, we are sorry to state, in rather bad condition. Twenty-eight beetles, however, were alive, including nine of *O. chalybeus*, and no effort will be spared to keep them in good condition and to induce them to propagate.

[1] From Insect Life for December, issued by the U. S. Division of Entomology.

LETTERS TO THE EDITOR.

*** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.

The editor will be glad to publish any queries consonant with the character of the journal.

The First Locomotive.

I AM surprised that your correspondent, "M. H.," in his article in your issue of the 15th, "The First Locomotive Run in America," should have been so mistaken in its name. There is a small