Mr. Atkinson may perhaps say that this method "depends upon completing the square"; this is true in a sense, of course; but the point of view is really different from the "method of completing the square" usually found in text-books. Practically, the usual method is clumsy, and inferior to the solution by formula; and from the theoretical point of view it is objectionable, because it obscures the real nature of the problem. And I feel sure that many teachers and examiners will agree with me in saying that the educational value of the process is practically *nil*: bright boys go on to the general formula, dull ones follow the rule mechanically, and might just as well be drilled in the use of the general formula itself. G. B. MATHEWS.

WEST INDIAN RESOURCES.[1]

AS expert adviser in botanical and agricultural questions to the recent West India Commission, Dr. Morris undertook the preparation of a lengthy report dealing with the economic resources of those Colonies, the causes of whose distress were the subject of investigation. This paper formed Appendix A of the Report of the Commissioners which was issued last autumn, and the praise bestowed on it as an interesting and valuable survey by one who was specially qualified both by general and local knowledge to undertake the task, induced the Secretary of State for the Colonies to rescue it from the oblivion which is the fate of many important papers appearing in Blue Books. Mr. Chamberlain's desire to have it published in a form more accessible and convenient for the public here and in the Colonies, has resulted in its being converted into an independent volume, and now appears as the first number of an Additional Series of the *Kew Bulletin*. For this purpose the work has been revised and enlarged, a full account of the botanical organisation of each Colony, and lists of books and papers containing further information, being added.

After all that has been dinned into our ears for a long time past about the absolute necessity for the Mother Country to assist the sugar-planters by bounties or countervailing duties, it is refreshing to find a book, every page of which contains an unbiased statement of the natural resources of these unfortunate Colonies. As Mr. Thiselton-Dyer states in a prefatory note: "Dr. Morris's residence in the West Indies, his repeated visits to them, and his intimate knowledge of their conditions, have enabled him to produce an account as accurate as it is impartial of their natural and economic resources, which is certainly more complete than anything hitherto available. Why the West Indian Colonies have failed to reach success, and in what direction the path to it lies in the future, can be readily understood by any one who will take the trouble to read these pages."

The Colonies dealt with have an area about equal to that of Great Britain and Ireland, with the population of Wales. Out of the entire area little more than 2 per cent. is now under cultivation, and only 7 per cent. of the estimated cultivable area. In fact, while about a million and a half acres are being cultivated, over twenty million acres more are suitable for bearing crops. Guiana has an extent of country equal to two Ceylons quite untouched; Trinidad has the wealth of the Straits Settlements going to waste; and the unworked soils of Jamaica could be made to produce the prosperity of at least four Colonies the size of Mauritius. As is well known, the Colonies have long depended almost wholly on the sugar trade as the staple industry, everything else being unworthy of consideration by the planters. Minerals are of comparatively trifling value, being limited practically to gold in Guiana and pitch in Trinidad. Essentially the true wealth of the colonists lies in the products and resources of the rich and fertile soil. In some of the islands it has of late years been recognised that it is as well to be prepared to cultivate more than one kind of produce; but, taken as a whole, we may regard the Colonies as given up to sugar growing, and, as Dr. Morris states:

"In most of the Colonies the situation is undoubtedly aggravated by their almost entire dependence on one industry. This is a source of grave danger in more ways than one. It is dangerous commercially, for any great depreciation of prices immediately affects the whole community. It is dangerous agriculturally, for adverse seasons or hostile tariffs may plunge at any moment the entire labouring population into great distress. Again, the growth of a single crop lends itself sooner or later to the spread of disease, and it rarely leads, owing to the neglect of other resources, to the production of the largest profit. To these may be added the narrowing effects produced on those engaged in the industry, and their inability or disinclination when a crisis comes to take up any other industry."

A dozen chapters are devoted to giving a full account of the past and present of each section of the Colonies—Guiana, Barbados, Trinidad, Tobago, Grenada, St. Lucia, St. Vincent, Dominica, Montserrat, Antigua, St. Kitts-Nevis, and Jamaica. As bearing upon the question of the mistake of relying upon a single industry, Guiana affords us some interesting facts. It is the largest and most valuable of our possessions in the neighbourhood, its capabilities of development are practically unlimited, and yet it is one of the most distressed of the Colonies. The region was ceded to us by the Dutch in 1815, it has an area of 109,000 square miles, a dozen large rivers flowing into the Atlantic, and a population of a little over a quarter of a million, or less than three persons to a square mile. The inland districts are practically uninhabited, nine-tenths of the population clinging to the coast. Under the Dutch sugar, coffee, and cotton were extensively cultivated, but with the transfer to the British Crown the planters gradually concentrated their energies more and more on one article and neglected the others. In 1829 the sugar yield was 46,026 tons, coffee 9,230,486 lb., and cotton 1,596,171 lb. By 1849 the coffee and cotton estates were rapidly disappearing, and in 1887 the returns showed 134,876 tons of sugar, while all other exports had practically ceased. It is this grasping at the most valuable prize, and utterly neglecting all opportunities in other directions, that has led to the downfall of this naturally wealthy country. "The whole activity of British Guiana during the last sixty years has been confined to the narrow strip of land along the coast. In spite of the vast extent of rich and fertile lands in the interior, with the exception of the gold industry, nothing has been done to develop them, and consequently the Colony is now in so critical a condition, owing to its entire dependence on a single industry, that its very existence as a civilised country is in jeopardy." With the knowledge that under another régime coffee and cotton were successfully grown in the district, it would be absurd to suppose, as some contend, that the soil can produce nothing else than sugar. The land devoted to sugar canes is a stiff clay, and fit for little else; but then it forms only the one-thousandth part of the total area of Guiana, and, as Dr. Morris remarks, there is nowhere such an extensive area of rich and fertile lands, with a comparatively healthy climate, and within easy reach of such good markets, as the Crown lands of this district. They can grow nearly every tropical product in demand, either in the New or the Old World.

Suggestions are made and particulars given as to increasing the resources of the country by adding profit-

[1] "A Report on the Agricultural Resources and Requirements of British Guiana and the West India Islands." By D. Morris, C.M.G., M.A., D.Sc., F.L.S., Assistant Director, Royal Gardens, Kew. *Kew Bulletin of Miscellaneous Information*, Additional Series I. Pp. viii + 165, and Map. (London: Eyre and Spottiswoode, Her Majesty's Stationery Office, 1898.)

able industries to the now seriously depressed sugar trade. More than a third of the population is composed of coolies from India, and this explains the importation of 50,000,000 lb. of rice annually; but as the conditions are favourable to the cultivation of rice on the spot, it is surprising that no steps have been taken to establish rice fields, if only for purposes of home consumption. The United States import bananas to the value of two millions sterling annually, but British Guiana makes no attempt to place any fruit on the market, although one shipping company offered to take 10,000 bunches of bananas every fortnight. Coffee, cacao, cocoa-nuts, cattle rearing, and other paying industries are recommended, and also the utilisation of the extensive forests for the production of valuable timber, guttapercha, indiarubber, &c. At present the forest lands bring in a revenue of 48,000*l.* in "acre money," nearly all of which is swallowed up in the cost of collection. Under competent management these forests could be made to contribute largely to the wealth of the Colony.

But there is evidently a stubborn determination on the part of a large proportion of the colonists in the West Indies to ridicule every proposal for the introduction of new industries, and notwithstanding the ruinous experience of recent years, they insist upon regarding sugar, and sugar only, as the sole means of salvation. Any person with an open mind who attends meetings in London at which the sugar planters or their representatives discuss West Indian affairs, cannot help being struck by the general desire to leave out of consideration questions relating to subsidiary industries. Still, in spite of this unwillingness to have other things to fall back upon, subsidiary industries are making some headway, and the out-and-out supporters of sugar growing cannot but admit that this is so. At the meeting of the Royal Colonial Institute on March 8, the lecturer stated that in the four essentially English islands of Barbados, Antigua, St. Kitts and Nevis, sugar is the sole possible staple; while in the five islands, Dominica, St. Lucia, St. Vincent, Grenada and Tobago, occupied by people differing from those in the other four in language and customs, the cultivation of sugar has given place to cacao, coffee, spices, and other products. Grenada, which sixty years ago contained 119 sugar estates, is now quite independent of sugar. Colonel Duncan has established on the island the largest and most valuable nutmeg plantation in any part of the New World. Are the misfortunes of the sugar-growing islands to be attributed to the "essentially English" character of their inhabitants?

Jamaica supplies us with a good illustration of the wisdom of selecting suitable marketable commodities for cultivation, in addition to the staple industry. As in other islands sugar was here once the one great object of cultivation, and in the year 1805 the exports were 150,352 hogsheads of sugar and over 5,000,000 gallons of rum. Even within recent years sugar, rum, and molasses formed the bulk of the trade, for in 1881-82 out of the total exports, valued at 1,178,594*l.*, the sugar products amounted to 910,027*l.*; but by 1895-96, when the total exports had increased to nearly 1,900,000*l.*, the sugar products had declined to little more than 360,000*l.* The serious depression in Jamaica dates back many years, and when it was hinted to the colonists that it would be well to introduce other cultural industries to assist in warding off the threatened crash, the idea was received with scorn and contempt. Thirty years ago Captain Bush, an American trader, began to encourage fruit growing, but for some years the venture made very slow progress, for by 1879 the fruit exports did not amount to 23,000*l.* It was realised, however, that the time had arrived to do something to save the island, and as there were no indications of an improved sugar trade, fruit had to come to the front, and by 1889 the exports had risen to 320,323*l.*, and by 1895-96 to 536,811*l.*, three-fifths of this trade being in bananas. From this it will be gathered that the fruit trade of the island is already far more valuable than that of sugar. One of the defects of the new industry is that there is not sufficient attention given to the manner in which the various fruits should be packed for the markets, an art in which our foreign competitors excel. In addition to sugar and fruit Jamaica has under cultivation coffee, cacao, allspice, ginger, fustic, &c., so that the entire failure of sugar would not now be anything like so disastrous as it would have been a quarter of a century ago.

All through this excellent and comprehensive report on a very difficult question, it is to be observed that the author does not propose anything with the object of hastening the end of the great sugar industry, but he recognises the necessity for supplementing, not supplanting, the staple trade by the introduction of a variety of cultural industries which would increase the wealth of the Colonies to an appreciable extent. In an appendix Dr. Morris propounds, at the request of the Chairman of the Commission, a scheme for the establishment of a Department of Economic Botany, and for agricultural instruction for developing the resources of the Leeward and Windward Islands and Tobago, and for affording assistance to the experimental cane cultivation to be carried on, in continuance of present efforts, in British Guiana, Barbados, and Antigua, at an estimated annual cost of 27,000*l.*, a scheme which, it is hoped, will be found to be accepted by the Government when Mr. Chamberlain brings the proposal for assistance before the House of Commons shortly.

H. H.

ON THE BREEDING HABITS OF THE GREY SEAL.

THE grey seal (*Halichærus grypus*) is to be met with on many parts of the British coasts, from Orkney and Shetland, throughout the Hebrides, on the north and west coasts of Ireland, and occasionally on the south and east, on the coast of Wales, in the Wash, more rarely in the Solent, and as far south as Jersey (*Zoologist*, 1884, p. 337); hence greater opportunities for observing it, and learning something of its habits, have occurred than has been the case with the ringed, bearded, and hooded seals. Moreover, several observers have contributed information on its breeding habits and on the conditition of the young soon after birth. The following may be cited. So long ago as 1837, Mr. J. Wilson, writing on the habits of Scottish seals (*Mag. Zool. and Bot.*, i. p. 539), states that the young of the grey seal is "born above high-water mark in the end of September or beginning of October, and is at first covered with white hair, which is retained for many weeks, but shed before it takes to the water." His observations are confirmed by Edmondston, who, in his account of the seals of Shetland ("Zetland Isles," vol. ii. p. 294), remarks of the grey seal that the young are brought forth in September, October, or November. Nilsson and some other writers who have followed him have expressed the opinion that the breeding season of this species is in February; and Bell, in an attempt to explain this discrepancy ("Brit. Quad.," 2nd edition, p. 267), has suggested that the milder climate of Britain permits of pairing taking place much earlier than in Scandinavia. From the united testimony, however, of other observers, there can be no doubt that this is a mistake, and that the breeding season is in the autumn. Prof. Collett, of Christiania, who some years since contributed an excellent paper on the grey seal to the *Proceedings* of the Zoological Society (1881, pp. 380-87),