portance of the discovery, whether for its practical utility or for its application in general pathology." The committee investigated ninety cases treated by Pasteur. Of this number, twenty-four had been bitten on naked parts by undoubtedly rabid dogs, and the wounds were not cauterized, nor otherwise treated in any way likely to have prevented the action of the virus. Of thirty-one that were bitten, there was no clear evidence that the dogs were rabid, and in others the bites had been inflicted through the clothes. It is estimated, from experience of the results of bites in other cases, that, had they not been inoculated, not less than eight among these ninety persons would have died. Not one of them has shown since the inoculation any signs of hydrophobia. The committee thinks it certain that the inoculations practised by M. Pasteur have prevented the occurrence of hydrophobia in a large proportion of those who, if they had not been so inoculated, would have died of that disease. And his discovery shows that it may become possible to arrest by inoculation, even after infection, other diseases besides hydrophobia.

If rabies be not reduced among the dogs of England, there will always be a large number of persons who will require treatment. The average annual number of deaths from hydrophobia during the ten years ending 1885, was, in all England, 43; in London alone, 8.5. These numbers may be taken as representing only five per cent of the persons bitten, so that the preventive treatment will be required for 860 persons in all England, and for 170 in London alone.

In commenting on this report of the committee, the London *Lancet* says that "their verdict is the most important yet pronounced upon the subject, and must go far to decide the question of the prophylactic value of the inoculation of Pasteur. The conclusion that the method has saved a considerable number of lives, and that it is at present, and probably will be for long, the only mode of saving from death those who have been bitten by a rabid dog, affords strong support to Pasteur's conclusions, and, we need hardly say, must have most important practical results."

MEASLES. — The prevalence of measles in some parts of the world, and its fatality, have aroused health-authorities to such an appreciation of the necessity for restricting the spread of this disease, that official steps are being taken for the attainment of this end. A recent occurrence at Portsmouth, England, makes the necessity for this work more emphatic. H. M. S. Crocodile arrived at that place with forty persons sick with measles on board, who were permitted to land. From these individuals the disease has spread to an epidemic, and at last reports the number of deaths was one hundred and ninety-seven.

LEPROSY IN LOUISIANA. — Considerable excitement has been occasioned in Louisiana by the report that leprosy existed at St. Martinsville in that State. The State Board of Health has made an examination, and finds that five persons are suffering from undoubted leprosy, while three others are as yet in doubt.

BOOK-REVIEWS.

Chance and Luck: a Discussion of the Laws of Luck, Coincidences, Wagers, Lotteries, and the Fallacies of Gambling; with Notes on Poker and Martingales. By RICHARD A. PROCTOR. London, Longmans, Green, & Co.

THE persistency of a superstition can generally be referred to the subtleness and persuasiveness of the logic upon which it is founded, or to the fact that it appeals to a strong instinct in human nature. Doubtless both these influences have been at work in keeping alive, among those in whom the hazarding instinct is at all strong, a fondness towards a belief in their own favoritism, in the obscure forces which control luck, and in the sundry other agencies which go to make of chance something which is more than chance. For the benefit of such, — and they form a respectable portion, both in size and ability, of mankind, — Mr. Proctor has written this book. He hopes to be able to convince a few of the errors of their ways, sadly recognizing "that the gambling fraternity will continue to proclaim their belief in luck, . . . and the community on whom they prey will, for the most part, continue to submit to the process of plucking, in full belief that they are on their way to fortune."

The wide-spread belief in luck is in many ways easy to account for, and even to defend. There is an element of chance that enters in the lives of every one of us; and it is but natural that where this chance favors the success of our projects, — though not the least to our credit, — this should have a decided influence in the shaping of our character. Much that is attributed to good fortune is really good common sense and wise forethought; but, allowing for that, as long as there remains this element of uncertainty in our lives, it is evident that there must be certain individuals who are lucky, in the sense that they have been fortunate when they had no very good reason to expect success, and certain others who have been unlucky under the same circumstances. But this, Mr. Proctor well insists, is a very different thing from the common conception of a lucky individual, which regards such a man as more likely to be fortunate in success depending entirely on chance, in the future; as a chosen being for whose benefit the laws of probabilities will be suspended, and who can, even with considerable confidence, count upon such benign intervention. It is this conception that has the strongest hold upon gamblers, upon the wisest and sharpest of them, as well as upon the people at large, and is a very ridiculous and a very dangerous superstition. If some way could be devised by which the expectation, the subjective feeling of confidence, could be properly proportioned to the mathematical chance of securing the desired prize, lotteries could no longer exist, and the chance forms of gambling would appear as utter folly. The methods by which such occupations are carried on are devised to carefully prevent any such enlightenment, and they easily succeed in so doing.

The logic of the matter is very simple. Take lotteries as an example. If ten persons each deposit five dollars, and agree that the one throwing the highest number of points with a pair of dice shall receive the fifty dollars, that would be a fair lottery. To test its fairness, we have simply to consider, that, if one person bought all ten deposits, he would be sure to win, and would neither lose nor gain: in other words, mathematically the price to be paid for a share in a lottery is obtained by dividing the amount that can be gained by the number of shares. No lottery of this sort would pay: hence no paying lottery is fair, and every lottery that exists pays those who control it very well indeed. The Louisiana lottery, the peculiarity of which Mr. Proctor characterizes as 'the calm admission, in all advertisements, that it is a gross and unmitigated swindle,' sells monthly 100,000 tickets at five dollars each. Deducting from the $500,000 thus received as much as $10.000 for expenses, and a similar amount for 'the charitable and educational purposes' for which the State sanctions the lottery, there remain $480,000. Instead of distributing all this in prizes, they distribute only $265,000; and thus, when all the tickets are sold, — and few are ever left, — the managers have a clear profit of forty-five per cent per month. This is exactly the same kind of swindling as would be committed by the man who invited the ten persons to deposit their five dollars, were he to give the one who threw the highest number of points $26.50, and quietly pocket the $23.50 as a reward for his trouble. Lotteries exist and pay, because people are willing to give more for the chance of securing a prize than they ought to give. They dwell frequently and long on the immensity of the prize, entirely underestimating the slightness of the possibility of their securing it, and thus cherish a sort of optimism which overlooks barefaced robbery and tolerates the most glaring frauds. That such is the case was experimentally demonstrated by the English Government. Tickets for a lottery were offered for sale, not at a fixed price, but for what they would fetch. The contractors bought of the government tickets mathematically worth £10 at £16, and again sold the tickets at a large advance. The public was perfectly willing, and actually asked, to be plundered.

Gambling-banks and the superstitions of gamblers offer a still more interesting topic. Here there is often much ingenuity displayed in arranging plans by which apparently fortunes must be won, and in defending pet notions with an array of apparently sound argument. But the reason why a bank must win has often been exposed. It is simply that it reserves for itself, under certain conditions (apparently very unlikely), a certain sum, apparently small, or it stakes a larger sum at exaggerated odds for the great probability of winning a small fee. Thus the *refait* in *rouge et noir*, which apparently is a most improbable event, must, by the doctrine

of probabilities, occur sufficiently often to give the bank a sure profit of 1.1 per cent on every deposit. The fallacy of those who devise sure methods of defeating the bank ('martingales,' as they are termed, lies in the fact that they neglect to consider that the fortunes of any one gambler, compared to that of the bank, is small: they prove that in the long-run they must win, forgetting that they only have a short run. As a matter of fact, when their schemes require the risk of a very large sum, they generally are afraid to make the risk, and so leave the game with the firm conviction, that, had they but possessed a litttle more money, success would have been insured.

The gambling superstition that has probably worked more ruin than any other is what they term the 'maturity of chances.' The gambler says, to toss aces six times running is certainly a highly improbable event: if, therefore, aces have fallen five times, it is much more certain that the next throw will not fall an ace than if ace had not been thrown five times. The absurdity of this doctrine, apart from its being disproved by actual trial, can be easily shown. The chance of the occurrence of a certain event has no meaning after the event has occurred: it then has become a certainty. The chances of throwing an ace are as 1 to 6 on each throw, and entirely without reference to other throws. If I enter a room and pick up a die, the chances of my throwing an ace are as 1 to 6: to be told afterwards that five aces had just been thrown with that die, could evidently not influence the chances of my throwing an ace. Yet this doctrine is defended in the books on gambling, and is carried into practice at the gaming-table, to the ruin of many of its adherents.

Mr. Proctor gives very clear expositions of the fallacies underlying such beliefs; makes a forcible statement of the swindling processes to which even the better class of gamblers, lottery-holders, and the like, must resort; and illustrates his arguments with facts derived from actual experience. The book is no theorist's exposition merely, — it really ought not to matter if it were, because here theory and practice have been found to agree, — and is thus excellently calculated to meet the purpose for which it was written. It is in every respect a commendable work. Men desirous of guiding their actions by reason will here find expressed the position they should take on matters of chance and luck.

Our Temperaments; their Study and their Teaching. By Alexander Stewart. London, Crosby, Lockwood, & Co. 8°.

Dr. Stewart gives in his preface a description of what this book is. "Impressed by the frequency with which the word 'temperament' is used to account for the action that is taken not only on the ordinary but on the eventful occurrences of life; while so little is known of the temperaments, that very few outside the medical profession can name off-hand the four principal ones, — the sanguine, the bilious, the lymphatic, and the nervous, — I have endeavored to construct, from scattered and scanty material and my own observation, a practical guide by which observers may know the temperament of any one by looking at him, and associate with it certain mental qualities and traits of character." The author points out the disparity between the part the temperaments play in medicine and in general literature. He accords them a more definite value than expression and physiognomy, and believes them more available than phrenology, for the reason that the physical characteristics of the temperaments are definite, few, and readily observed.

Dr. Stewart has collated an immense mass of observations on the temperaments from ancient, mediæval, and modern literature, and uses it to illustrate and expound his own argument. He first makes clear the ordinarily received medical doctrine of the temperaments, and then endeavors to give it added precision and scientific value. Dr. Stewart himself recognizes the just limitations of the doctrine which he develops. He sees, in the first place, that it applies only to civilized races; and, second, since the physical characteristics and the influences that modify the mental habit vary in different climates and countries, that it holds most forcibly with the British, since it is from that nation that the distinctions have been drawn.

Perhaps the greatest advance made by the present writer is the assignment of precise form-characteristics to the different temperaments. He gives a table, in which one column contains the physical, and the other the mental, characteristics of the four pure temperaments. These are very full and explicit. The physical characteristics are seven, — three relating to color (of the hair, eyes, and complexion), and four to form (of the face, nose, neck, and body).

The nervous temperament is accorded a special chapter, that the common error of confusing it with nervousness may be avoided. Nervousness, so far from being a normal characteristic, is described as "altogether a departure from the natural or healthy manifestations of the temperament." To the nervous temperament is ascribed the tempering, softening, and refining of the other three. "What literature would be without the grace, the tenderness, the sublimity of poetry, the other temperaments would be without the nervous" (p. 132). After a discussion of the compound temperaments, the practical applications of our knowledge of them are taken up. The aid they may render in education, in the choice of a congenial and fitting profession, and in the promotion of health, is developed in a most interesting way. By way of illustrating the form-characteristics mentioned, and to enable observers to classify faces by them, a number of engravings are given from Lodge's 'Historical Portraits.' Dr. Stewart has certainly given us a most entertaining and valuable study in anthropology, and the publishers have done their full share in making it attractive to the reader.

Report of the Scientific Results of the Exploring Voyage of the 'Challenger.' Zoölogy, vol. xix. London, Government. 4°.

In this volume, Hubrecht reports on the *Nemertea*, his contribution comprising one hundred and fifty pages and sixteen finely drawn plates. The 'Challenger' nemerteans were few in number, and only some twenty stations afforded specimens. Of these stations, only five were over one hundred fathoms, and only three of these exceeded one thousand fathoms. *Carinina grata* and *Cerebratulus angusticeps* were obtained from these three, but the last species was dredged elsewhere at a depth of only ten fathoms. The most aberrant types were the above-mentioned *Carinina* and the pelagic *Pelagonemertes*. The section-cutter was the chief instrument of investigation, and the number of sections made exceeded 19,500. The report is divided into a systematic and an anatomical part, followed by a chapter on theoretical considerations. The latter will afford reading of much interest to those who are not engaged in the study of nemerteans. The conclusion reached by the author is, that "more than any other class of invertebrate animals, the *Nemertea* have preserved in their organization traces of such features as must have been characteristic of those animal forms by which a transition has been gradually brought about from the archicœlous diploblastic (cœlenterate) type to those enterocœlous *Triploblastica* that have afterward developed into the *Chordata* (*Urochorda*, *Hemichorda*, *Cephalochorda*, and *Vertebrata*)." This statement excludes the idea of any direct ancestral relations between *Nemertea* and *Chordata*, and fully recognizes the points of agreement between *Balanoglossus* and *Amphioxus*.

The clear and weighty arguments by which the author sustains this proposition do not admit of condensation.

The reports on the *Cumacea* and *Phyllocarida* are by Prof. G. O. Sars, where that distinguished naturalist finds himself on congenial ground. The number of species of the former group obtained by the 'Challenger' is fifteen, ranging, among them, from the surface to 2,050 fathoms in bathymetric distribution. In addition to the more purely systematic part, Professor Sars discusses the derivation of the group, and gives a summary of the characters of all the families, and enumerates the genera of which each is composed. The memoir is illustrated by eleven plates, distinguished by that accuracy and beauty which characterize all the work of Professor Sars' facile pencil.

To the single genus of recent *Phyllocarida* heretofore known (all the others being palæozoic fossils), the 'Challenger' expedition added two new generic types, which are naturally of great interest. The illustration and description of these take but three plates and some thirty odd pages of text, in which the author fully discusses the history, morphology, and development of the group, and the homologies of the several parts in the *Nebaliidæ* with those of other recent *Crustacea*. As regards the phylogenetic relations, the