

monde," but at that time the astronomical significance of the Egyptian temples, or even of our own less pretentious Stonehenge, had not been demonstrated.

Sir Norman Lockyer has shown in "The Dawn of Astronomy" that the enormous edifice at Karnak, the temple of Amen-Ra, was oriented for a similar purpose, so that at the setting of the sun on the day of the solstice, and at that time only, the solar beam flashed along the darkened axis of the temple, some 500 yards long, and illuminated the "holy of holies" wherein the priest was ready to fulfil the rites of "the Manifestation of Ra." He has also shown that Stonehenge was erected for a similar purpose about the year 1680 B.C., but in this case the limb of the actual (rising) sun was observed, the avenue simply forming the sight-line to the point on the horizon where the sun-god would make his first appearance on the day of the solstice.

But although since Lalande made the statement quoted above it has been shown that the gnomon at Florence is not the *largest* monument to astronomy the world has ever seen, it is still one of the most interesting. As may be gathered from the accompanying illustration, the sunlight, passing through the southern window of the lantern, falls on to the gnomon, which is built into the marble sill of the window, and thence, through a circular orifice, on to a "solstitial" marble slab let into the cathedral floor some 300 feet below, where its correct position at the solstice is marked, or was intended to be marked.

This immense meridian instrument was probably designed by Toscanelli in order to provide exact observations for the correction of the Alphonsine tables which were then in use, but which represented very inadequately the solar motion, more especially as regards the true length of the tropical year. Whether he also intended to observe the variation of the obliquity of the ecliptic is a much discussed question, but it does not seem improbable. In either case his gnomon, probably built only in 1468 A.D., could not answer this purpose anything like so surely as do the Amen-Ra and Stonehenge structures, built many centuries earlier. Apart from this reason, the facts that the gnomon itself has been removed from its original position, and that the solstitial circle on the cathedral floor has been found to be erroneously placed, have destroyed for ever the instrument's utility in this direction. It has been used, however, in order to detect any possible movement in the fabric of the cathedral, but, to the credit of Brunelleschi, who built the structure, no such movement has ever been demonstrated.

In the light of the recent articles in NATURE (p. 153) concerning the fires, &c., by which the ancient British festivals were celebrated, it is interesting to note that Mr. Parr considers that the great display of fireworks, which to the modern Florentine forms the chief attraction of the Midsummer Day festival, is simply the analogue of the "St. John's Fires" kindled in former times to celebrate the advent of the summer solstice. On that day huge crowds of Florentines flock to the cathedral in order to celebrate the festival of their patron saint, St. Giovanni, and at night the great dome itself is illuminated.

W. E. R.

THE TRAINING OF THE BODY AND MIND.

FOR years the London County Council has arranged a conference of teachers during January, and this time it was held on January 4-6 at the Medical Examination Hall on the Victoria Embankment. In the old days, when the County Council was only interested in technical instruction, the meetings were devoted to the interests of science teachers more particularly, but now that general education has been added to the responsibilities of the body that governs London, matters appertaining to all kinds of teaching are considered at the conferences.

The first day's work was, however, devoted to a subject that affects all education, namely, that training of the body which is correlated with the proper development of the mind. Mr. A. J. Shephard (vice-chairman of the education committee of the London County Council), who opened the conference, urged the importance of a complete education, and Colonel Malcolm Fox (inspector of physical

training to the Board of Education) read the first paper, which dealt more particularly with physical training in elementary schools. He began with a brief sketch of the history of gymnastics and physical culture in general, though going no further back than the days of ancient Greece, which, in its beautifully symmetrical statues, has left us undoubted evidence that it had little to learn in the science of training the body.

Colonel Fox went on to say that the Greeks practised little of what we understand as gymnastics, and attained their object by such exercises as riding, dancing, leaping, or running, and he pointed out that the trend of gymnastic opinion is again turning strongly in the same direction. As the power of Greece declined, her universal physical culture ceased to be national, and passed to the individual whose business it was to afford entertainment by exhibiting his prowess in the arena. When the remnants of greatness passed to Rome, no physical training became general, as the many contented themselves with the excitement afforded by the efforts of the trained few. It is true that the "sporting nobles" of the famous Tenth Legion used from time to time to descend into the arena, competing with some favourite team in the chariot races, or matching their skill with sword and shield against the net and trident. This action was, however, exceptional, and the period bears the picture of a vast concourse hanging with fevered excitement on every stroke of sword or cast of net—spectators at a game that they themselves had little ability or desire to play. To find a modern parallel to such a scene we have unfortunately not far to seek.

After touching on the absence of any definite system of gymnastics also in the middle ages, and the recommendation of exercises as a cure for certain complaints as early as the sixteenth century, the reader of the paper traced the use of systems in France, in Germany, where gymnastics were first used in an educational sense, in Switzerland, where Pestalozzi adopted them, and in Sweden, where between 1776 and 1839 Ling was the pioneer in classifying gymnastics into groups and arranging them scientifically in accordance with the needs of the human body.

Colonel Fox described how, after an interregnum, revivals of physical training took place, and stated that under the tests of modern physiological knowledge the Swedish system of Ling stands out preeminently above all others. He further dwelt on the mild and gradual work in its early stages, on its effects upon the body and success in other countries, as well as its educational results. These admit of no immediately apparent proof, but they do exist, as a few weeks' trial of them will most assuredly show. Psychology, Colonel Fox said, with our limited knowledge, allows of deductions only from experience, and the latter is unanimous that the educational results claimed by Ling are gained, and that the qualities of courage, obedience, decision, alertness, concentration of thought, and self-confidence are not confined to the hour or two of the gymnastic lesson, but become part and parcel of the child's nature.

After speaking of methods, duration of lessons, the dearth of male teachers, and matters of interest to elementary and other teachers, Colonel Fox concluded by quoting figures from the report of a Royal Commission on Physical Education in Scotland. Of 600 children examined in Aberdeen, only 326 were found to be in good health, while of the same number in Edinburgh but 171 were found to be sound.

The next paper was by Mr. W. Langbridge (headmaster of Wolverley Street School, Bethnal Green), and dealt with exercises which can with advantage be performed in classrooms and afford a relief to ordinary lessons during which activities are constrained.

In the afternoon Sir Lauder Brunton took the chair, and discussed education in connection with the threefold character of man. At first, he said, moral training was provided, and churches and cathedrals were built long before the people could read or write; then mental culture was considered, and became very general; and, lastly, it was being recognised that the condition of the body had considerable effect upon the morals and the mind, so that a physical training was also considered necessary. He gave some interesting instances to show how character

and habits had been entirely altered by accidents to the brain, and said that while Newton was physically weak, Young, who was his superior even in mental capacity, was a circus rider, and could perform almost any bodily feat.

Sir Lauder Brunton spoke of the need to train the higher inhibitory nerve centres, and of the possibility of keeping in order involuntary movements. He said that children could not do physical exercises unless they were properly fed, and urged that no damage must be done by over-exertion. Medical inspection was desirable, but teachers, he thought, could easily learn to recognise the signs of danger.

Dr. Kerr (medical adviser to the London County Council Education Committee) took as his subject the position of physical exercises in the infant department of the elementary school. He pointed out that while certain of the nerve cells in the infant were quickly matured, and this was especially so with those dealing with behaviour that has been hereditary for long periods, other nerve cells were still capable of being acted upon for a considerable time. In this state they were very susceptible to fatigue, and frequent periods of rest were needed in which the waste products from action could be removed. He advised the use of physical exercises for infants, and maintained that no great perfection of detail ought to be looked for.

Of a different character was Mrs. Kimmins's paper on the educational value of organised play, for it was a graphic account of the way in which most of the benefits claimed as coming from physical training could be gained out of school, and in the particular case described, away from it.

All the speakers upon physical exercises agreed that these were only complementary to games; and in the last paper of the day Miss Kingston (organising instructor of physical exercises of the London County Council) discussed the interrelation of drill and organised play.

It should be pointed out that all concerned were most anxious that the word drill should not be used, as it called up in the mind military drill, something quite different from the exercises and unfitted for children. There was also considerable unanimity as regards the need for the pupils to do the work for its own sake and as a pleasure, and not as a task. Sir Lauder Brunton was most emphatic on this point, as was also Dr. Kerr. The Rev. Stuart Headlam, a member of the old School Board, in the discussion objected to things being made too pleasant, but it had been pointed out that even games pall if they are too much organised, and their interest and freshness thus lost.

There is no doubt but that as true nature-study should properly put the child so far as possible into the same mental relation with its surroundings that primitive man enjoyed, so physical exercises adopted in a pleasurable way should counteract the baneful effects of civilisation, as Dr. Kerr pointed out on Thursday, and, one may add, give our young people the bodily advantages of their remote ancestors.

As on previous occasions, Mr. C. A. Buckmaster and Dr. Kimmins (chief inspectors, respectively, to the Board of Education and the London County Council, education committee) organised the conference in a remarkably successful manner.

WILFRED MARK WEBB.

COLOUR VISION IN THE PERIPHERAL RETINA.¹

THE results of a research into the nature of colour vision in the peripheral portions of the retina, carried on by Mr. Baird during the years 1903 and 1904 in the psychological laboratory of Cornell University, have lately been published in a pamphlet. The work so carefully done by Hess and the numerous papers by him on this subject have received fairly general acceptance, and in the present work Mr. Baird confirms most of Hess's conclusions. The reason he gives for the publication of a pamphlet which contains little new work of any great value is that Hellpach, in his research on the nature of colour sensation in the peripheral retina, had arrived at conclusions which

¹ "The Colour Sensitivity of the Peripheral Retina." By John Wallace Baird. Pp. 80. (Published by the Carnegie Institution of Washington, 1905.)

controverted many of the statements of earlier observers, and it was deemed advisable to repeat Hellpach's work in order to see whether there might not be some fallacy in the method. Mr. Baird's work practically in every respect confirms that of Hess, and we think there is little doubt that his explanation of the confusing results obtained by Hellpach is correct, that Hellpach did not allow sufficient time to elapse between successive stimulations, and consequently the colour sensation due to the immediate stimulation was partly modified by a latent after image of the preceding stimulus.

In standardising his colours, Mr. Baird arrived at practically the same results as Hess. The red used transmitted no part of the visible spectrum, and Hess, in order to get a stable red, had to mix it with a certain amount of blue. The yellow, green, and blue used corresponded fairly exactly with Hess's stable colours.

It is when we come to the problem of equating the white values of the different colours that the greatest difficulty is met with. We must confess to a strong suspicion of the value of Mr. Baird's method. He is engaged on a research on the nature of colour vision in the peripheral retina, and in the determination of his standards he utilises the very portion of the retina which he is subsequently going to investigate. We quite allow that there is no satisfactory method of equating white values at present known, but we certainly think that Mr. Baird has chosen the least satisfactory of all. Probably the best method of photometry available at present depends on the flicker phenomenon, and for Mr. Baird's purpose we feel sure it would have been much more suitable and much more scientific than the method he did adopt.

In other respects the work has evidently been carefully done, and though, as we have said, it adds little that is new to our stock of knowledge, it is of value in that it confirms much of the work of previous observers.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

DR. R. A. LEHFELDT, professor of physics at the East London College, has been appointed to the chair of physics in the Transvaal Technical Institute, Johannesburg.

THE Corporation of Glasgow has resolved to make a grant of 10,000*l.* to the building fund of the Glasgow and West of Scotland Technical College, from the common good of the city.

It is satisfactory to find a committee of the Classical Association reporting that "in view of the legitimate claims of other subjects the amount of time devoted to the classics on the classical side of boys' public schools is as great as can reasonably be expected." From the report which was presented at a meeting of the association on Saturday last, it appears that in the highest form on the classical side in the larger public schools a considerable amount of specialisation is allowed to many boys. In the other forms the time devoted to Greek and Latin together generally amounts to about one-half of the whole number of school hours. In the smaller public schools there is less specialisation in the highest form. The proportion of time given in school to classics increases from somewhat less than one-third in the lowest form in which both Greek and Latin are studied to slightly less than two-thirds in the highest form. The committee suggested that time and effort might be saved and better results obtained by certain changes in the method of teaching Greek; and in the discussion upon the resolutions put forward with this end in view, we are glad to see that Canon Lyttelton, headmaster of Eton, pointed out that the time gained by the adoption of the plan proposed "might well be given to instruction in some of the elements of scientific knowledge rather than to history and archaeology. Let them hold out a helping hand to their scientific colleagues and meet them half-way. There had been too little conciliation between the two sections of teachers. Then we might hope to correlate these great subjects, which were too important to abandon, but which we had not yet enabled to live in amity together."