works and finishes well, so that it would appear to be suitable for export; but the annual outturn is only computed at 1500 tons, and there is a good local demand for construction work, for carriage shafts, draught poles and various agricultural implements. Burma padauk must be distinguished from Andaman padauk, obtained from *Pterocarpus dalbergioides*, which is noted for the brilliant red colour of select logs. Although inferior in colour, Burma padauk is much superior in strength and durability, and is regularly supplied to the Ordnance Department for spokes and felloes of wheels, poles, yokes, and other purposes. Timber which does not comply with the stringent requirements of the Ordnance Department is quite suitable for wheel work, furniture, and interior decorations. Both kinds of padauk have been imported to England and America, but various causes have militated against their successful exploitation in this country.

A forest pamphlet (No. 16) issued by the Government of India is devoted to an account of experiments conducted by Mr. R. S. Hole with the view of determining the best season for coppice fellings of teak. The rainy season—mid-August to October—is frequently selected for felling, although it might be expected that, vegetative activity being then at its height, the development of coppice shoots would be poor. However, the trials carried out, with many precautions, indicate that the worst period for the fellings is from the time, April to August, when vegetative activity commences, up to and for a short time after the full development of the foliage, and that reproduction is most vigorous in the months of March and September. Incidentally, the author notes that good fertile seed has been obtained from nine-year-old coppice shoots of teak.

It is a coincidence that information regarding the importance of trees belonging to the Dipterocarpaceæ should be forthcoming simultaneously from Burma and the Philippines. In the *Philippine Journal of Science* (Botany, vol. iv., part vi.) Mr. H. N. Whitford presents some striking estimates regarding the preponderance of the family in the Philippine forests, according to which Dipterocarp trees may be expected to yield three-quarters of the total volume of merchantable timber growing in a virgin forest area computed at 30,000 square miles. He directs special attention to the value of the woods known locally as "lauan," yielded by species of Pentacme, Shorea, and Parashorea, and "apitong," yielded by species of Dipterocarpus; the former are slightly harder but similar to white pine, while the latter compare with the hard pines.

A paper on Indian State forestry, by Mr. S. Eardley-Wilmot, late Inspector-General of Forests, is published in the Journal of the Society of Arts (April 1). He mentions that the forest department has control over an area of 240,000 square miles—about one-fifth part of British India—from which 4½ million tons of timber and 180 million tons of bamboos are extracted annually. A rough demarcation of the forests is indicated as follows. They range from a height of 14,000 feet, where birch and firs supply the chief constituents, to the mangrove belts situated at sea-level. At an altitude of 8000 feet rhododendrons, oaks, cedars, and pines flourish in different regions. *Dalbergia Sissoo* and *Acacia Catechu* grow in the submontane forests. The deciduous forests at a lower elevation supply teak, sál, ebony, and ironwood, while important evergreen forests are found near the coast or further inland.

A number of interesting problems receiving attention at the Swedish Royal Forestry Institute are detailed in the Proceedings (*Meddelanden från Statens Skogsförsöksanstalt*, part vi., 1909), such as the examination of the native forests from an ecological standpoint, the best trees to plant on heath or swamp land, and the improvement of regeneration by the selection of seed. In connection with the last problem, Dr. N. Sylven communicates the results of his attempt to identify different races or types of the spruce; he distinguishes five types, according to their mode of branching, of which the so-called "kamm" type is recommended as the best seed-bearer. An extensive paper by Mr. E. Wibeck deals with the extent of the beech forests in Sweden, showing that the area has decreased greatly in a period of 200 years, having been reduced partly by human agency, by fires, for the manufacture of potash, and by excessive cutting, and partly by natural causes, such as the intrusion of the spruce.

Two articles by Mr. R. Thomson on the Jequié Manicoba rubber tree, *Manihot dichotoma*, published in the *Indian Forester* (vol. xxxvi., Nos. 1–3), contain suggestions which appear to be worthy of careful consideration. This species, indigenous to the State of Bahia, in Brazil, forms a tree about 20 feet in height, and develops a stem 20 inches in circumference. The author contends that, being much smaller than the Para rubber tree, there is less production of useless material, and that it could be planted more closely, so that by planting 1200 specimens to the acre he estimates a production of 600 lb. of rubber per acre in the fifth year. It is further suggested that climatic difficulties might be overcome by a system of cultivation in rough sheds, such as is adopted in California for growing pineapples.

TINCTORIAL CHEMISTRY, ANCIENT AND MODERN.

IN his recent presidential address to the Society of Dyers and Colourists Prof. Meldola touched upon several matters of general interest and importance. Referring to the substitution of synthetical for natural dyes, which has entailed great changes in the dyer's methods, he said:—"Such a revolution in an industry of venerable antiquity as has been effected in about half a century has, perhaps, never before been witnessed in the history of applied science. Scientific discovery has, it is true, called new branches of industry into existence, and has thus opened up new fields of human enterprise and outlets for capital and labour. But in this case there has been no new creation; an ancient industry at the touch of science has become transformed.

"If it be asked to what cause or causes this rapid development is due, there can be only one answer—the development of the science of organic chemistry. From the time of Perkin's discovery of mauve in 1856, down to the very latest patents for new dyestuffs, it has been science, and nothing but science, all along the line."

It is, of course, equally true, as Prof. Meldola has himself pointed out elsewhere, that the development of the science of organic chemistry has been greatly accelerated by the large amount of research work carried out in the laboratories of the large German colour manufactories. In regard to the general question of the interdependence of science and industry, he has been one of the chief propagandists for the last twenty-five years, on the platform and in the Press; and on this matter he said:—"It has long been familiar to students of economics—whether we in this country recognise the doctrine or not—that industrial development is ultimately dependent upon scientific development. Fiscal considerations may have some influence in promoting or retarding an industry, but primarily the financial economist, as well as the political economist, is dependent upon the materials supplied by productive industry, and the production of these materials in the most advantageous way and the addition of new materials to the resources of civilisation is the business of scientific research, and it is, therefore, scientific activity which is the real and solid basis of national prosperity. The nation which fails to realise this principle is bound to go under in the long run in that industrial struggle which is certain to become keener with the progress of science and the severity of competition arising therefrom."

This primarily important matter cannot be too often brought forward, but, at the same time, although we have much leeway to make up before we come abreast with our chief industrial competitors, there are signs that at last the nation *is* "waking up" to realise the position. The daily Press, as reflecting the average interests of the public, is now paying an increasing amount of attention to scientific matters. It is no doubt an easy matter to be adversely critical in regard to the quality of the science which is served up in our morning paper, but that is easily remedied, and the all-important matter is that science is fast achieving a prominent place as a current newspaper topic.

An adequate historical survey of the modern science of tinctorial chemistry has yet to be written. In his address Prof. Meldola supplied one chapter of such history by relating his personal experiences during the fifteen years (1870–85) he was directly connected with the manufacture of synthetical dyestuffs. It is not possible to summarise this historical survey in the space now at disposal, but the hope may be expressed that Prof. Meldola will find opportunity to write the complete story of the art of dyeing. It would be equally as fascinating as his well-known contributions to Darwinism.

Having given his personal reminiscences of the most prolific period during the rapid modern development of the industry, Prof. Meldola reverted to remote antiquity, and summarised the ancient industrial history of dyeing as described by the elder Pliny in his "History of Nature," written about the beginning of the Christian era. Indigo has probably been used by the natives of India for at least 3000 years, and by processes essentially the same as those used to-day; in fact, until Perkin's discovery of the first coal-tar dye in 1856, the art of dyeing has made comparatively little progress since the ancient Briton stained his body with woad.

The most important dye in ancient times was the Tyrian purple, the use of which was at first confined by law to the Imperial House—hence the expression "born in the purple."

"The modern sequel to this ancient chapter of tinctorial art," said Prof. Meldola, "has been supplied by P. Friedländer, who has extracted the colouring matter from the Mediterranean *Murex brandaris*, and has proved it to be dibromindigo.[1] And thus ancient observation, which found practical application in the utilisation of a certain mollusc as a source of colour, has led to a remarkable biochemical discovery; but we have had to wait some 2000 years for the answer to the question, What was the purple dye of the ancients? Shall we have to wait another 2000 years for the answer to the question, How does the living shell-fish synthesise the generator of dibromindigo?"

Much has been written, and many diverse opinions have been expressed, as to the cause or causes of the loss of the coal-tar colour industry to England. This has been variously attributed to defects in our Patent Laws, to our heavy excise duty on alcohol, and to our unsuitable industrial conditions. In this matter Prof. Meldola sounded no uncertain note. "The answer to this last question has been staring us broadly in the face for over thirty years. It is amazing that there should have ever been any doubt about, or any other cause suggested than the true cause, which is *research*—writ large! The foreign manufacturers knew what it meant and realised its importance, and they tapped the universities and technical high schools, and they added research departments and research chemists to their factories, while our manufacturers were taking no steps at all, or were calmly hugging themselves into a state of false security, based on the belief that the old order under which they had been prosperous was imperishable. It is true that when the effects of the new discoveries began to make themselves felt, one or two factories did add a research chemist to the staff, but the number and the means of work were totally inadequate. I happened to be one of them, and so I speak with some practical knowledge of the conditions. We were but as a handful of light skirmishers against an army of trained legionaries. What could three or four—say half a dozen at a liberal estimate—research chemists, working under every disadvantage, do against scores, increasing to hundreds, of highly trained university chemists, equipped with all the facilities for research, encouraged and paid to devote their whole time to research, and backed up by technological skill of the highest order? The cause of the decline of our supremacy in this colour industry is no mystery—it is transparently and painfully obvious. In the early stages of its decadence it had little or nothing to do with faulty patent legislation or excise restrictions with respect to alcohol. The decay of the British industry set in from the time when the Continental factories allied themselves with pure science and the British manufacturers neglected such aid, or secured it to an absurdly inadequate extent in view of the strength of the competing forces."

It still remains to inquire the reason for this different attitude towards chemical research which was, and is still, though in lesser degree, adopted by our manufacturers. At the time we lost the industry the skill of the British workman and the enterprise of the British manufacturer were the admiration of the world, but the colour industry did not develop here because our industrial leaders did not lay the foundation of success by subsidising and cultivating chemical research. Why? The answer to this question is to be ultimately found in the utter lack of appreciation of the value and importance of scientific method which existed at that time amongst the public in this country. It would then have been impossible to convince any body of shareholders that it was a sound business proposition to expend yearly many thousands of pounds in research work the outcome of which was problematical. It would, indeed, not be an easy task even in these more enlightened days.

WALTER M. GARDNER.

[1] *Berl. Ber.*, 1909, vol. xlii., p. 765. For this research 12,000 molluscs were extracted, the total yield of pure colour being 0·4 grms. The dibromindigo is formed from its colourless generator, which is a vital product of the organism, by the action of light. The actual compound is shown to be the 6:6[1]-dibromindigo, but the nature of the intermediate generator has not yet been determined.

THE MEDICAL INSPECTION OF SCHOOL CHILDREN.[1]

LESS than three years ago there did not exist a medical department of the Board of Education. To-day there lies before us a Blue-book, of 170 pages, detailing, with much substance, the work undertaken or done to establish and regulate the vast system of medical inspection of schools and school children now operative over the length and breadth of England. In modern social history no movement has come so rapidly to maturity as the system of inspection here, for the first time, placed in a connected way before the general and official public. In a lucid preliminary section Dr. Newman briefly sketches the relation of our present developments to the efforts, both here and on the Continent, towards a systematic medical supervision of school children. "In the latter year (1865), the report of the School Commission in Norway did something to bring the importance of school hygiene once more before the general public, and in 1866 Hermann Cohn undertook his classic researches into the eyesight of over 10,000 children at Breslau" (p. 2). Cohn, now dead, was one of the venerable figures at the first International Congress of School Hygiene at Nuremberg. He was still full of energy and enthusiasm. Much occasional and disconnected local work followed, but "the Wiesbaden system marks the introduction of a new conception and understanding of the problem. This system, which has been widely adopted in Germany, treats the child as the centre of interest and his well-being as the end of reform, to which even the most satisfactory school environment is only a means. . . . Throughout the German Empire a large number of school doctors have been appointed, and so some 350 towns and communities have undertaken in a greater or less degree the work of medical supervision of school life" (p. 4)—a good result since the first appointments in Wiesbaden in 1896.

The English movement, though prepared for by many workers in personal and public hygiene, dates from the report of the Royal Commission on Physical Training (Scotland) in 1903. Dr. Newman does not make it perfectly clear why, at this particular juncture in British history, such a report should have been called for; but there is no doubt that the Commission arose out of the revelations of physical inefficiency made during the great South African war, particularly at the recruiting stations. There was then a rising wave of opinion on the need for better physical training in the early stages of life. Incidentally, and, as it were, casually, the supreme need for medical inspection was revealed, and, up to date, this

[1] Board of Education. Annual Report for 1908 of the Chief Medical Officer of the Board of Education. Pp. 170. Cd. 4986. (London: Eyre and Spottiswoode, 1910.) Price 8½*d*.