Shellac in the Moulding Industry.

By N. Narasimha Murthy, M.Sc., A.I.I.Sc.

SHELLAC was used in India as the plastic material in the manufacture of bangles and sealing-wax. The moulding powders made with shellac are similar to sealing-wax in composition but contain a greater percentage of fillers. These moulding powders in admixture with various natural resins such as copal, dammar and bitumen, were extensively used in foreign countries for making door knobs, bottle stoppers, push buttons, terminal heads, radio-dials, etc. With the advent of gramophone industry and the increasing use of shellac in the electrical industries the price of shellac went up and cheaper synthetic substitutes came into use.

The synthetic substitutes used for making gramophone records are celluloid, cellulose acetate, cellulose xanthate and resorcinol-formaldehyde resin. The records made from these resins in contrast to the shellac solid stock records have the advantages of light weight and non-fragility. But the use of the trailing needle to overcome needle-drag, and the resiliency of the sides contribute towards distortion of sound especially at high frequencies. The impressions are not even, and in some cases they are only sub-permanent. Besides, they wear out the stampers during manufacture. Hence the substitutes have not made much headway into the field of gramophone industry; and still, nearly 50 per cent. of the output of shellac is consumed in this industry.

In the electrical industry shellac is chiefly used for bonding mica, and for making laminated tubes and boards. The synthetic substitutes used for mica is the glyptal resin, the phenol formaldehyde resin being unsuitable as it does not wet mica. Glyptal, however, is very costly when compared especially with the present price of shellac and is said to deteriorate on ageing.

The phenol-formaldehyde resin has replaced shellac to a large extent in the laminated boards and tubes industry, chiefly on account of its resistance to heat. It suffers, however, from the defect known as tracking and is not well suited for high voltage insulation for which shellac is preferred.

The phenol-formaldehyde resin is chiefly used for composite moulding of electrical objects like switch covers, bases, socket plugs, and for objects of general utility such as umbrella handles, brush backs, etc. Shellac can be used in place of bakelite for most of those objects where resistance to heat above 80°C. is not essential. The necessary mechanical strength can be imparted by using fibrous fillers such as fabric, wood flour, asbestos, etc. The heat stability can be improved by curing under high heat and pressure in the presence of accelerators just as in the case of bakelite. Improvement in the resistance to water can be brought about if shellac modified by chemical treatment is employed.

The present low price of shellac and diminished exports is a suitable opportunity for starting moulding industries in India using shellac. Research work should therefore be undertaken in collaboration with well-equipped electrical laboratories in India wherein the shellac composition could be moulded to the required shape and then subjected to tests. No foreign country can be depended upon for the continued consumption of our raw products, and only in finding a market in our own country, can a future for shellac be ensured.

Science News.

The Malpaharias and the Census of 1931.—Mr. Sasanka Sarkar, Anthropological Laboratory, Indian Museum, Calcutta, writes:—In the *Census Report of Behar and Orissa* for 1931 (p. 233), it is stated that the "Malpaharias speak a language which has been classified as a form of the western dialect of Bengali." It is true that some Malpaharias have adopted a corrupt form of Bengali as their language but in the course of my investigations among them in 1929, I found that the villages under Bugalows, Litipara and Kunjbona still retain Malto as their mother tongue. The excess of 7,560 individuals mentioned in page 245 of the samo Report over the total population is without doubt due to the Malpaharias who have not given up Malto as their mother tongue. The above contention is also borne out by the statements of Mr. Tallents, who wrote the *Census Report for Behar and Orissa* in 1921. He wrote: "On the border country of Bugalows, Litipara and Kunjbona in Pakur there are people who call themselves Malpaharias but speak Malto and intermarry with Saurias."

* * *

India in 1931-32.—This annual publication which is familiar to most of our readers includes reports of the progress achieved during the year in the field of Agriculture and Industry, Health and Education, and the various scientific surveys under the control of the Imperial Government. Thanks to the Imperial Council of Agricultural Research, a scheme of provincial research on Rice was instituted under which "all species isolated will be fully described, maintained and made available to all parts of India and Burma, selected types will be interchanged and a botanical and agricultural survey made of local rices in each province. The scheme provides for a chain of research stations with suitable sub-stations for special tracts." The Imperial Council of Agricultural Research continued to foster agricultural and veterinary research as an all-India body and subsidised research in five Universities and assisted schemes of research connected with the Sugar Industry and the locust problems besides several other schemes bearing on agriculture and live-stock. With regard to cotton the most important development of recent years was the success obtained by a type of cotton known as *Verum* 262 which has been found to be wilt-resistant and far superior in staple to existing types. The record of work on tobacco too, is

noteworthy and the fact that India occupies a pre-eminent position in the tobacco growing countries of the world, and accounts for 90 per cent. of the total quantity grown in the British Empire, will serve to show the great need for intensive research in order to produce quality tobacco suitable for international markets. Encouraging results have been obtained from experiments directed towards the introduction of exotic varieties and improving plant and methods of curing. In the field of Medical Research, the Indian Research Fund Association financed 57 enquiries connected with problems of malaria, kala-azar, leprosy, helminthological and nutritional diseases, the use of bacterio-phages in dysentery and cholera, maternal mortality, morbidity in child birth, sprue and the anæmias of pregnancy.

Although the activities of the five surveys of India—archæological, topographical, geological, botanical and zoological—were considerably restricted due to retrenchment of both funds and personnel, yet several outstanding results have emerged during the year. The final publication of the three-volume monograph "Mohenjodaro and the Indus Civilization" edited by Sir John Marshall and published by Messrs. Probsthain & Co., in a most attractive form is one of the noteworthy achievements of the year. The topographical survey extended its work of surveying high mountain regions of Nanga Parbat and Haramush. The total area surveyed during the year was approximately 59,000 sq. miles. An improved form of "Macleod Bar" was made in the workshop at Dehra Dun and has been in constant use with the duplication of presses in the photo Zinco office at Dehra Dun. The geological survey issued a highly useful geological map of India on a scale of 32 miles to the inch, and published several important memoirs bearing on the coal resources of India. The Botanical and Zoological surveys maintained their usual high standard of activities. The valuable collection of butterflies in the Indian Museum was rearranged and due to the co-ordinated efforts of the anthropological and archæological sections the identifications of human and animal remains were carried out for the Bombay Natural History Society, the Harcourt Butler Institute of Public Health, Burma, the Calcutta School of Tropical Medicine and other institutions.

* * *

Pasteur Institute of S. India.—The annual report of the Director of the Institute for 1933, which was presented before the annual general meeting held at Madras on the 19th December points out that during the year the mortality from rabies was the lowest rate on record being only 0.38 per cent. and this is probably traceable to the introduction of Paris Fixed Virus, and higher dosages for the treatment. The report, however, says that it is too early to draw conclusions regarding the efficacy of these innovations, and the experiments have to be continued. The Institute at Coonoor prepares vaccines for the treatment of rabies and during the year made it available in 107 centres distributed throughout the Madras Presidency, the Mysore, Travancore, Cochin and Pudukotah States, and in the Nizam's Dominions. The collection and tabulation of case cards and preparation of statistical records are being continued.

* * *

Lac Research in India.—In his annual report for the financial year 1932-33, the Special Inquiry Officer, Lac Cess Committee, draws attention to a few important achievements in Lac Research during the year, such for instance, as the indexing of technical literature bearing on lac and allied subjects, carrying out exhaustive verification trials of the tentative *American Bleaching Test* which has been claimed to be a means of standardising seedlac and gives an indication of its age and dewaxing of lacs by various solvent processes. The outstanding feature of the year was the sanctioning by the Indian Lac Cess Committee and the Government of India, of a scheme of applied research in the United Kingdom into shellac and lac products in relation to modern consuming industries. The price of shellac was remarkably low during the year and although this has helped the retention of its use in the manufacture of high class gramophone records, the future does not appear to be cheerful as the gramophone industry is a luxury trade and is liable to suffer severely due to economic depression.

* * *

A Note on fog and haze at Poona during the cold season.—By Dr. L. A. Ramdas and Mr. S. Atmanathan.—The note summarises the results of a study of fog or haze which occurs almost daily over Poona during the cold season. The variation of intensity and thickness of the phenomenon has been studied both visually and photographically from the 120-feet tower of the Meteorological Office. The vertical distribution of temperature in the first 120 feet above ground during fog or haze based on observations taken with an Assmann Psychrometer is also discussed. The note concludes with a brief description of the effects of local winds on the distribution of haze.

* * *

On the nature of the frequency distribution of precipitation in India during the monsoon months, June to September.—By D. Sankaranarayanan.—In this note rainfall of 68 representative Indian stations situated in the field of the monsoon current is analysed with a view to test the nature of the frequency distribution during the monsoon months, June to September. $\sqrt{\beta_1}$ and β_2 according to the Pearsonian notation, are obtained for these stations and the variations in their magnitudes traced. The departures of these constants from 0 and 3 are tested for their significance. The paper concludes with the remark that the departures are not sufficiently high to lead to the assumption of a non-normal distribution over the greater part of the plains of India.

* * *

Himalayan Expedition Club.—With a view to carry out the exploration work of the hitherto unknown parts of the Himalayas, and encourage sportsmanlike spirit among Indians, and to produce bold adventurous and intrepid young men for ærial, marine and climbing explorations, Mr. G. D. Joshi has organised a Club called the "Indian Himalayan Exploration Club". The Club contemplates carrying out of geographical, zoological, botanical, geological and other scientific research in the unexplored tracts. The Club will arrange to send annual expeditions to Himalayas; in the Summer of 1934 an expedition to Kailash is contemplated. Membership is open to all interested persons above the age of 18 years.

A strong Committee of distinguished people representing different professions, has been formed.

* * *

Common Indian Trees and how to know them.—An important publication from the Forest Research Institute, Dehra Dun, prepared by R. N. Parker, I.F.S., and illustrated by Ganga Singh, dealing with forty common trees most conspicuous in the plains of India excluding the moist parts of Assam and Bengal and a tract about 100 miles wide along the Sea Coast. The book which is amply illustrated has been prepared to meet the demand for a simple book on the common trees and not intended for botanists. The more common botanical terms, which will be found essential to follow the descriptions in the text, are explained in the introduction and with the help of the explanations and the illustrations, the layman not initiated into the phraseology of the botanist will be able to follow the text. The descriptions, uses, propagation and habitat of each tree are given and the book will be found to be very useful as a simple introduction to one important branch of nature study.

* * *

Problem of Industrial Chemistry.—Under the auspices of the Pachiayappa's College Science Association, Dr. B. B. Dey delivered a lecture on the "Problem of Industrial Chemistry in India" on the 13th December. In the course of his lecture Dr. Dey said that although the main industry of a country is Agriculture, yet several other requirements of man are supplied through other industries. Large quantities of sulphuric acid are used in these industries, and India imports more than 20,000 tons annually for her requirements. The lecturer then described the difficulties that industries had to contend against in India, such for instance, as the high railway freights, Tariff protection and transport facilities. The problem of Alkali manufacture deserves consideration and where fuel is scarce it should be possible to utilise electrical energy. Moneyed classes in India have to be awakened and by thus obtaining the necessary capital, chemical industries could be improved. India had plenty of raw materials and could harness labour. If properly utilised, there is a good future for industries in the country.

* * *

Imperial Institute of Veterinary Research, Muktesar.—The annual report of the Institute for the year ending 31st March has recently been published. The report shows that research was organised under three sections: Pathology, Serology and Protozoology. In the Serology Section Mr. Haddow devoted the major portion of his time to the work on Rinderpest. Satisfactory results have been obtained with experiments on the immunisation of calves with goat virus, and by virtue of its being cheap and easy to apply, this method will be the method of choice in those places where the animals can be treated at the optimum age. The question of concentration and fractionation of anti-rinderpest serum was intensively studied during the year, and it is hoped that in the near future it would be possible to improve a low potency serum to such an extent that discarding will be avoided, and to raise the potency of a normal serum to that which is required for the immunisation of very susceptible animals or as a curative agent. In the Section of Pathology, Capt. Datta made an intensive study of a peculiar form of a liver cirrhosis and the well-known disease as *Bursati* both of which are met with in horses. In the Section of Protozoology, Mr. S. K. Sen made a definite advance in the subject of *Theileria* infection in cattle. It seems probable that the parasite responsible for the acute cases of *Theileriasis* is a species which has not been recorded in this country. Experimental treatment of this parasite has not so far been successful.

Twenty-two papers were published by members of the staff during the year.

* * *

Report of the Travancore Education Reforms Committee.—We have received a copy of this interesting document which we hope to be able to review at an early date. The recommendations made for the reform of State Education appear to us sufficiently important to deserve longer and carefully considered notice.

* * *

Indian Economic Conference.—Prof. C. D. Thompson's address delivered at the Economic Conference which met at Chidambaram in the beginning of this month will be read with wide interest and we are not quite sure if all his theories and views on the ratio-exchange, currency and production and utility will be accepted without demur. Our chief interest in the address is the reference to the exact sciences. While making out a case for the position of economics among the sisterhood of exact sciences like Astronomy and Physics, the Professor is reported to have stated that "man can only wait for astronomical changes and measure them so carefully that he is able to foretell many future changes," and that "if you ask the most learned Physicist to foretell where a newspaper dropped from a window will fall, he can do little better than a man who knows nothing of Physics." "The Zoologist would be astonished if he were asked to prophesy the number of books on economics which would be eaten by white-ants next year." Questions put in this form will puzzle not only the scientists but the prophets of the Old Testament as well. The business of the Astronomer is not to wait for the appearance of changes or phenomena in the sky and the motions of the Heavenly bodies, but by means of mathematical calculations anticipate them and watch their appearance when it occurs. Within certain limits the meteorologist, by studying the data, is able to forecast the weather conditions. If the physicist were given all the data such as the direction and velocity of wind blowing at the time of dropping the newspaper, the initial push it receives at the time of the throw, the weight of the paper and the nature of the surrounding objects, he will, with his mathematical calculations, be able to state within reasonable limits of precision the exact position of the landing, provided other forces do not intefere during the descent of the paper. Similarly given the number of white-ants in a given locality, the power of the consumption of each one of them during the twenty-four hours and the number of leaves in the books on economics, the Zoologist may accept the question and provide an answer. But the function of science whether exact or inexact is not to prophesy, but to investigate the truth which is carefully described. The former is the province of other departments of learning.

* * *

We acknowledge with thanks the receipt of the following :—

"Nature," Vol. 132, Nos. 3341 to 3345.
"The Chemical Age," Vol. 29, Nos. 750 to 754.
"Canadian Journal of Research," Vol. 9, No. 4.
"The Journal of Chemical Physics," Vol. 1, No. 11.
"The Biochemical Journal," Vol. 27, No. 5.
"Berichte Der Deutschen Chemischen Gesellschaft," 66 Jahrg, No. 12.
"Journal of Agricultural Research," Vol. 47, Nos. 6 to 8.
"Experiment Station Record," Vol. 69, Nos. 3 to 5.
"American Journal of Botany," Vol. 20, No. 9.
"The Journal of Nutrition," Vol. 6, No. 6.
"The Review of Scientific Instruments," Vol. 4, No. 11.
"The Mathematics Student," Vol. 1, No. 3.
"Scientific Indian," Vol. 10, No. 59.
"Indian Forester," Vol. 59, No. 12.
"Medico-Surgical Suggestions," Vol. 2, No. 11.
"Memoirs of the Indian Meteorological Department," Vol. 26, Parts 2 and 3.
"Contributions from Boyce Thompson Institute," Vol. 1, Nos. 25 to 27.
"Transactions of the Mining and Geological Institute of India," Vol. 28, Part 3.
"The Indian Journal of Agricultural Science," Vol. 3, No. 5.
"Indian Forest Records," Vol. 18, Part 10, Vol. 19, Part 11.
Report of the President of the Carnegie Institution of Washington for the year ending Oct. 31, 1932.
"The Nagpur Agricultural College Magazine," Vol. 8, No. 2.
"Physica," Vol. 1, No. 1.
"Fisheries and Marine Biological Survey of the Union of South Africa—Report," Nos. 8 to 10.
"The Indian Trade Journal," Vol. CXI, Nos. 1433 to 1436.

Reviews.

RECENT ADVANCES IN PHYSICS (Non-Atomic). By F. H. Newman, D.Sc., A.R.C.S., F.Inst.P. 51 Illustrations. (London, J. & A. Churchhill, 1932.) 15*s*.

Professor Newman's book "Recent Advances in Physics (Non-Atomic)" is a companion volume to the two volumes of Prof. Castelfranchi's "Recent Advances in Atomic Physics". The author has dealt with the subject under eight heads as follows:—The wave-like character of Matter; The general properties of Matter; Acoustics; Low Temperatures; Electromagnetic Radiations; Magnetism; and Electricity. It is true that in such an attempt as this, of dealing with recent advances in Physics, in a single volume, the choice of the topics is one of opinion. However, the author has made a truly representative selection of matter. In the chapter on Acoustics has been included, topics like Sound ranging and Architectural Acoustics, important from the viewpoint of Engineering. The subject of the propagation of Electromagnetic Waves in ionised layers of the atmosphere which is being investigated by Professor Appleton and his co-workers has also been treated. One notices the omission of the treatment of the newest phases of Physical investigation, *viz.*, Nuclear constitution, the Neutron and the Positron. Probably the book was in press before the announcement of the important discoveries in these fields. The Chapters on Electromagnetic Radiations and on Magnetism, deserve special mention for their elegant and detailed treatment. A feature of the book in contrast to Professor Castelfranchi's two volumes is that references to original papers are given in the foot-notes in addition to the bibliography at the end of each chapter. This book can be confidently recommended to Honours and Post-graduate students in Universities.

* * *

CAUSALITY: A Law of Nature or a Maxim of the Naturalist? By L. Silberstein, Ph.D. (Macmillan & Co., Ltd., 1933.) Price 4*s*. 6*d*. net.

It has been thought by many a physicist that Determinism in natural phenomena, considered axiomatic in Science, received a severe blow in Heisenberg's famous principle of Indeterminacy enunciated in 1927. Ever since, there has been a keen contest between the upholders of the traditional view and the modern iconoclasts with the result that the Law of Causality is considered to require a restatement. Prof. Max Planck has ably upheld the deterministic view, holding that any indeterminateness in our knowledge is due to our imperfect powers, while to an ideal mind every event would be accurately determinate. He has also stressed the heuristic nature of the law of causality. The book under review is an expanded version of a lecture delivered by Dr. Silberstein in