
SCIENCE NOTES AND NEWS

A Remarkable New Fish from Bombay.—The last number of the *Records of the Indian Museum* (42, pp. 379–423, June 1940) contains an article by Mr. C. V. Kulkarni, "On the Systematic Position, Structural Modifications, Bionomics and Development of a remarkable new family of Cyprinodont Fishes from the province of Bombay". The new fish was discovered accidentally in the backwaters along the coast of the Bombay Presidency. As this discovery is likely to throw considerable light on the relationships and evolution of the Toothed-Carps, the very careful account of the fish by Mr. Kulkarni is of very special importance.

The most significant point about the new fish is the possession by the male of a massive and highly complicated organ for the transference to the body of the female in the neighbourhood of the genital opening of spermatophores, a structure discovered for the first time among fishes. Though a similar male organ for the transference of sperms is found among a variety of American Top Minnows, its occurrence in an allied Killifish of the Asiatic Continent has been discovered for the first time. It is worthy of note that the author has not confined himself to a mere taxonomic description of the species, but has given as detailed an account as possible of its morphology, bionomics and development. In these respects it is a unique paper in which a taxonomic account of great importance is accompanied by full details of the life-history and development of the species.

The paper is divided into four parts, Systematic Account, Structural Modifications, Bionomics and Embryology including larval development. In the first part, the author has given reasons for assigning this fish to a new family and has indicated its position among the Cyprinodont fishes by giving an outline classification of the Order after the latest scheme suggested by Hubbs and Myers. The diagnosis of the new family is given and the species is described in detail. In the second part, the structure of the gonopodium is described; it is a highly complicated organ and the author seems to have taken considerable pains in elucidating the relationships of its component parts; this portion of the work is extremely valuable. Mr. Kulkarni also directs attention to the asymmetrical position of the genital opening, the presence of the genital pads and the absence of the right pelvic fin in females. Each peculiarity is fully explained and suitable arguments offered for its utility.

The section dealing with Bionomics contains an account of the author's observations on mating, liberation of sperms from the spermatophores and laying of eggs; these observations are of a very high order and deserve special notice. In the embryological studies of the species the author has brought together a mass of valuable information. Special mention may, however, be made of the study of the development of the gonopodium and its ultimate differentiation into a complicated organ found

in the adult males. A useful comprehensive bibliography is given at the end. The paper is well illustrated with neat and suitable diagrams.
S. L. HORA.

Indian Vegetable Oils as Lubricants in Internal Combustion Engines.—Lubricating oil for use in internal combustion engines is mostly of mineral origin and India has hitherto been importing practically all her supplies of this essential material from abroad. Since the outbreak of war, severe restrictions have been imposed on the import of these oils and the appearance of Bulletin No. 18 of the *Industrial Research Bureau* on the "Utilization of Indian Vegetable Oils as Lubricants for Internal Combustion Engines" by J. S. Aggarwal and Lal C. Verman, is therefore very timely. The authors describe the results of preliminary experiments carried out by them on three important Indian Vegetable Oils, castor, groundnut and cotton seed. The chief defect which has hitherto stood in the way of vegetable oils being used as lubricants for internal combustion engines is the comparative ease with which they undergo oxidation at the high temperatures they are subjected to in the engine. This oxidation results in increase of (1) viscosity, (2) acid value and (3) carbon residue; all these three factors interfering with the efficient working of the engine and leading to corrosion and other troubles. Accelerated oxidation test in the presence of iron according to a modification of the Air Ministry technique have been carried out and the increase in viscosity, acid value and carbon residue measured, both with and without stabilizers. The results show that castor oil is far superior to the other two oils. Some of the stabilizers tried such as α -naphthol and hydroquinone are fairly effective in minimizing oxidation, but even castor oil, using the best stabilizer, is very much inferior to the high grade mineral lubricating oils on the market. It is necessary, however, that a lot more of work should be done and the investigation can only be regarded as a preliminary one. The results of engine trials with stabilized vegetable oils are to form the subject-matter of future papers and they will be awaited with great interest as they will be the final criterion on which the value of these vegetable oils as lubricants can be judged.
C. V.

Phosphate Manuring on Lateritic Soils.—The peculiarity of the red lateritic soils on account of their very high content of iron and alumina and their consequent ability to render insoluble and therefore non-available phosphates existing naturally in the soil and that which may be applied in a soluble form as fertiliser, constitutes a difficult problem in judging the quantity and mode of application of phosphate manures on such soils. Their content of iron and alumina is so great that they can immobilise soluble phosphates running in to even a hundred tons per acre, compared with which

the ordinary doses of a few hundredweights applied in practice amount to almost nothing. How then can the difficulty be got over? Neither lime nor organic matter nor any chemical amendment can minimise the high phosphate fixing capacity of these soils. Resort has to be made to practices designed to favour the plant in procuring its phosphate supply without an undue proportion being fixed by the soil (N.H. Parbery, *Agr. Gaz. of New South Wales*, 51, Part 4). In this view the placement of the fertiliser in the course of manuring is of paramount importance to ensure that the roots will enter the zone of phosphate fixation early in their development and before fixation by the soil has proceeded far. Superphosphate is adapted for this purpose as it is in granular form and as its phosphate diffuses only slowly through the soil moisture and, if the placement is correct, into the radius of the absorbing roots themselves. Fertiliser in coarse granular form and application in close proximity to the spread of the absorbing roots are therefore recommended; the quantities, however, are not indicated but a regular yearly dressing of superphosphate will be necessary. We may add that a practical way of judging the dose has long ago been suggested by Wagner according to which the maximum dose beyond which there is no response to superphosphate is found by experiment and thereafter only the quantity removed in the form of crop and other plant material is supplied as the yearly dose of the fertiliser. The problem in all its aspects is of great importance to South India, in view of the predominantly lateritic nature of its soils.

A. K. Y.

Affinities of Symphyla.—A monograph of considerable importance throwing fresh light on the bearing of Symphyla (Myriapoda) on the question of the inter-relationship of the different orders of Arthropoda and especially on the origin of insects has been published by O. W. Tiegs (*Quart. Journ. Micros. Sci.*, 82, Pt. I, 1-225). The author has studied the anatomy and embryology of *Hanseniella agilis* and has come to certain important conclusions regarding the affinities of the group (Symphyla) to which this animal belongs. The origin of both the Myriapoda and Insecta can be traced back to a Peripatus-like ancestor acquiring an increasingly perfect adaptation to life on land. The modification of the anterior segments and their incorporation in the head, the development of the Malpighian tubes from the hind gut, and the formation of eyes from groups of ocelli are all to be considered as attendant consequences of this land habit. From this protomyriapod ancestor was given off the Chilopoda which have a head simpler than in any existing myriapod or insect. The labium was a later addition and here arose the insects on the one hand and Diplopoda on the other. The insectan line is characterised by the development of a hexapod condition, the distinction between the thorax and abdomen, the development of compound eyes and the retention of the opisthognate condition. The specialisation along the diplopod line consisted in the production of diplosegments, the formation of the gnathochilarium by the fusion

of the maxillæ and the labium, and the formation, secondarily, of an anterior reproductive aperture. The Symphyla probably originated at the point of bifurcation of the ancestral stock into Insecta and Diplopoda, with the important diplopod character, *viz.*, the progoneate condition, incorporated in it. The development of *Hanseniella* corroborates this view.

Age of Manganese Ores in Central Provinces.—Doubts which have for long been entertained as to whether the manganese ores occurring in the Chhindwara, Nagpur, Balaghat and Bhandara Districts of the Central Provinces are in the main of the same age or whether the Balaghat-Ukua deposits are younger than those found further west in the Chhindwara and Nagpur Districts, have been dispelled by a recent study made by Sir Lewis Fermor, late of the Geological Survey of India. Sir Lewis inclines to the view that the deposits are of the same age and is of opinion that the differences are probably due to the fact that rocks at the western end of the belt have undergone a severe metamorphism than those at the eastern end.

The results of the study are published in a memoir of the Geological Survey of India, which deals with Archæan rocks of Chhindwara, Nagpur, Balaghat and Bhandara Districts of the Central Provinces. This tract of Archæan rocks includes the most important manganese deposits of India.

Endemic Fluorosis.—The latest report of the Public Health Commissioner with the Government of India includes an account of the studies relating to fluorosis which was first reported in 1936. The disease is characterised by a definite train of symptoms such as stiffness and pain in the spinal region and in various joints. A detailed study of this condition was carried out by the Health authorities of that province and it was shown to be one of chronic fluorine intoxication resulting from the continued use of water containing fluorides.

The problem is two-fold, namely, the prevalence in a comparatively wide geographical area of a dental condition, commonly known as "mottled enamel", and the occurrence in a restricted area, of severe manifestations of chronic fluorine intoxication involving the spine, joints and ligaments to which the name of endemic fluorosis has been given.

The presence of fluorides in drinking water supplies has been demonstrated over a fairly wide area in Madras, although sufficient work has not yet been done to de-limit the fluoride areas in the province.

During 1939 detailed house-to-house surveys were carried out in certain areas to ascertain the incidence of the condition with special reference to the customs, dietetic habits, length of residence in the affected areas and occupation of the inhabitants. These surveys have yielded valuable results.

The survey revealed that even with a high fluoride content of the water used for drinking and cooking, the incidence and severity of chronic fluorine intoxication is greatly influenced for the better by a well-balanced diet; that even

with a comparatively lower fluorine content in the water, an insufficiency of vitamin C and a high calcium value in the diet results in a higher and more severe incidence of fluorine intoxication, even the younger adult age groups becoming affected; and that in the absence of fluorides in the water, these dietetic deficiencies produce neither mottling of enamel nor bone manifestations.

Laboratory experiments on monkeys have confirmed these findings of the field survey. Two factors therefore, appear to be important in the production of fluorine intoxication, *viz.*, the presence of fluorides in toxic doses and an unbalanced diet with a pronounced deficiency of vitamin C.

Research work in the removal of fluorides from water has been carried out at the King Institute, Guindy. No method has so far been evolved for removing these salts from natural waters at what may be considered a cheap cost. It would therefore, appear that the practical solution of the problem of endemic fluorosis should be sought by remedying the nutritional defects of the population.

Indian Ephedra.—The concentration of the active principle in the Indian ephedra is comparable with that in the Chinese ephedra, which till lately constituted the chief source of supply of this drug, according to investigations carried out in the Forest Research Institute, Dehra Dun. Publication of the results of these investigations has attracted the attention of the drug market of the world to India as a possible source of supply of this drug, which is a potent remedy for asthma and hay fever.

Indian ephedra is now being exported to the United Kingdom, but till 1938, export to the United States of America was almost negligible. In 1937, China exported ephedra to the extent of over two million lbs., of which the United States of America alone took 1,196,000 lbs. But in 1938, when supplies from China and Spain were reduced by wars in those countries, India exported to the United States of America 446,300 lbs. of the drug worth about Rs. 88,000.

If Indian ephedra is to establish herself in the American market—for which this is the right time—there must be a regular supply of the drug of uniformly high quality. This can only be ensured if the right species of the plant are collected from suitable localities and at the proper season. Failure to attend to these essentials in the past, stood in the way of India's getting a permanent foothold for her produce in the world markets.

Progress of Broadcasting in India.—The first Annual Report of the All-India Radio up to March 31, 1939, which has been recently issued, traces the development of broadcasting in India from a Radio Club at Madras in 1924 to a complex Government-controlled organization of seven stations and twelve transmitters, with a total income for nine years of over one crore rupees.

With the Bombay Station of the Indian Broadcasting Company which was opened in 1927 began the history of regular broadcasting in India. Then the number of licensed listeners

was under 1,000, seventy-two times less than the number of licences in force in 1939. Gross licence fees in 1938-39 amounted to Rs. 7,50,261 and gross customs revenues to Rs. 13,70,320. Total programme transmission hours on the medium-wave rose to 16,670 and on the short-wave to 13,189.

With regard to radio programmes the All-India Radio has had to tackle, more directly than any other single institution, the problem arising out of a multiplicity of languages and complicated by a linguistic outlook of peculiar fluidity. Amidst a diversity of opinion, All-India Radio cannot hope to win universal approval in its linguistic efforts, but an attempt is made to proceed cautiously, though not illiberally, and to combine minimum diversity with maximum intelligibility.

It is yet too early to say how far the present educational policy of All-India Radio meets the requirements of the schools concerned. The object of school broadcasts is to supplement the work of the teacher, not to replace him. Widening the mental horizon of the students, and supplying such information and instruction as may be beyond the reach of the average institution... these constitute the double objective of school programmes.

A special feature of the Report is the large amount of information of a technical and engineering nature which includes a full account of the important work of the Research Department on the measurement of atmospherics in India, a report on field strength measurements of medium-wave stations, and technical information on the short-wave service. There are also separate chapters on the technical features of the Lahore Broadcasting centre, the new All-India Radio transmitting equipment, the design of studios, the village receiver and the Todapur receiving centre.

Indian Central Cotton Committee.—The progress of work done to improve and develop the 'growing, marketing and manufacture of cotton in India' during the last year is recorded in the Annual Report of the Indian Central Cotton Committee. The Report gives in detail the various researches conducted under the auspices of the Committee in several laboratories and agricultural research institutions. Fundamental research on cotton genetics, physiology and agronomy has been carried out at the *Institute of Plant Industry, Indore*, and many interesting results have been obtained. The Official Testing House of Cotton at Matunga conducted several researches relating to cotton technology, the most interesting of which was the investigation on the absorption of dyes by Indian cottons. The results obtained under several research schemes, by the agricultural departments of the Provinces and States are also recorded in this Report. The success achieved in the seed distribution schemes and in the introduction of improved varieties of cotton is not very striking and it is to be hoped that the Committee will spare no effort to bridge the gap between the experimental station and the cultivator and effect the maximum improvement in agricultural practice in as short a period of time as possible. The incorporation

of Cotton Statistics and various Acts relating to cotton control, cotton transport, etc., makes this Annual Report invaluable to all those who are interested in cotton in some way or other.

P. S. S.

Researches at the Lac Research Institute, Namkum.—An important section of the work done at the Institute, has been the production of shellac moulding powders, states the annual report of the Institute for the year 1939-40.

The Institute has developed or adapted methods for the manufacture of urea and formalin in quantities sufficient for moderate-sized factories and work has been done with a new chemical which has the property of further improving the quality of shellac-moulded articles.

This substance, melamine, is easily prepared from calcium cyanamide which, though not manufactured in India, is available in large quantities, being one of the basic fertilisers. The use of much smaller quantities of this melamine than urea is an economic advantage as well, and it is expected that it will play an important part in shellac mouldings in future.

It is with the same idea of developing a moulding industry entirely based on indigenous raw materials that two other powders have been formulated; a shellac-casein and a shellac-coaltar powder.

As a result of researches carried out at the Institute, it is stated, that shellac injection moulding, as distinct from compression moulding, promises a great future in the production of electro-technical goods. Already the Institute has been able to produce by this method electrical switches which can be sold much more cheaply than those made by compression moulding due to the higher rate of production and the simplicity of manufacture of the powder.

Research on Tuberculosis.—Consequent on a recent decision of the Central Committee, *The Tuberculosis Association of India* has paid a sum of Rs. 4,000 to *The Indian Research Fund Association* for an epidemiological enquiry on tuberculosis under Dr. R. G. Cochran, Chief Medical Officer, Lady Willingdon Leper Settlement, Chingleput, Madras. The Tuberculosis Association of India is not in a position to undertake independent research work in tuberculosis, at present.

A tuberculosis survey is being carried out in Vayalpad by the authorities of the Union Mission Tuberculosis Sanatorium, Arogyavara near Madanapalle (Madras). Up to the end of May 1940 they had examined 2,000 persons out of whom more than 45 per cent. were found infected with tuberculosis. From these positive cases, strongly reacting cases were taken to the Sanatorium for X-ray and 48 were detected to be suffering from the disease.

Dr. L. Sibaiya, D.Sc., F.Inst.P., F.A.Sc.—We have pleasure in congratulating Dr. L. Sibaiya on the doctoral degree conferred on him by the Syndicate of the Madras University on the presentation of his published papers relating to *Hyperfine Structure of Spectral Lines* and *The Solid and the Liquid States*, Dr. Sibaiya's

researches have received the highest compliments of the examiners to whom they were submitted, and it has been pointed out that the results obtained by him have an important bearing on the problems studied. He examined the structure of the spectral lines of elements such as mercury, copper, molybdenum, platinum, iridium, selenium, palladium, gold, germanium, rhodium, etc., for which he designed special types of water-cooled sources of radiation. Sufficient theoretical and empirical information regarding the nature and origin of hyperfine structure being then available, the isotopic constitution of platinum, gold and iridium was deduced from a study of the structure of their lines, the mass-spectrograph having till then failed to reveal the isotopic constitution of these elements. The conclusions regarding the isotopic constitution and the relative abundance of the isotopes in iridium have now been corroborated by Dempster's mass-spectrographic results. Significant results have been obtained from investigations on the self-reversal and Zeeman effect of hyperfine components. A review of the problems in hyperfine structure in relation to the isotopic constitution has been reported in the columns of *Curr. Sci.*, 1939, 8, No. 10.

In the second part dealing with the solid and the liquid states, the data on the light-scattering in crystalline solids and on the magnetic investigations of liquids and their mixtures are discussed. Considering a liquid as an assemblage of monochromatic oscillators, significant relations between its molecular volume, viscosity, Raman frequencies, surface tension and compressibility are shown to follow.

Dr. S. K. Kulkarni Jatkar, D.Sc., F.I.I.Sc., F.I.C., F.Inst.P., was awarded the D.Sc. in Chemistry of the Bombay University at the recent convocation, for his thesis on "Specific Heats of Organic Vapours from Supersonic Velocity". He is the second person to obtain the D.Sc. in Chemistry from Bombay University, the first being Dr. A. N. Yajnik of Lahore.

The production of optical glass in America was started in 1917, at first as a war industry, by Bausch and Lomb Optical Co., to supply the vital materials required for the pursuit of war and later on developed into a highly specialised national industry. A brief account of the development and manufacture of optical glass in America is given by M. Herbert Eisenhart and Everett W. Melson of this company in the *Scientific Monthly* (1940, 50, 323). The description includes a critical analysis of the exacting requirements of the optical glass of to-day. Great care taken in America in maintaining the purity of pots, the choice of the furnace, the composition of the batch, the mode of stirring and the process of annealing is clearly brought out.

In another useful paper entitled "Designing Corrected Lenses" by Walter Litten and issued by Bausch and Lomb Optical Co., the various errors to be borne in mind in the design of photographic lenses such as spherical and chromatic aberrations, coma, astigmatism and distortion, are described in non-technical

language and remedies suggested. The development of colour photography in recent years has made the task of the lens-designer more difficult. However, the best design for monotone with panchromatic materials will also be the best design for natural colour photography. The modern trends in the design of photolenses are indicated.

C. S. VENKATESWARAN.

ASTRONOMICAL NOTES

The Sun enters sign Libra and is at the autumnal equinox at 10^h 16^m I.S.T. on September 23.

Planets during September 1940.—Venus reaches greatest apparent elongation west of the Sun (45° 57') on September 5 and will continue to be a conspicuously bright object visible in the morning sky for over three hours before sunrise. Mercury is in superior conjunction with the Sun on September 4 and will not be in a favourable position for observation during the month. Likewise, Mars which has passed into the morning sky, will be too close to the Sun during the month and cannot be well observed.

Jupiter and Saturn which are apparently close to each other, rise at about 9 p.m. and are conveniently situated for observation in the latter part of the night. The former reaches a stationary point of its orbit on September 4 and begins to move westward among the stars. Saturn, about a degree and a half south of Jupiter, is also moving in the same direction. The brightness is increasing, the stellar magnitude being 0.3 in the middle of the month. The ring ellipse continues to widen and the angular dimensions of the major and minor axes are 43"·8 and 15"·3 respectively. On September 21 will occur close conjunctions of the Moon with these two planets. Uranus also is in the morning sky and will be on the meridian at about 4 a.m.

Variable Stars.—The well-known variable, α Cygni is expected to reach maximum brightness about September 30, when it will be of the fourth magnitude and easily visible with the naked eye. The period of variation of the star is approximately 413 days and the range

about 10 magnitudes, so that at minimum it can be seen only with a fairly large telescope. It is situated about midway between the two bright stars β and γ Cygni and can be readily identified. Another interesting variable, ρ Cygni—irregularly varying between magnitudes 3.5–6.0—will be found about two degrees south of the latter star.

T. P. B.

MAGNETIC NOTES

Magnetic conditions during July 1940 were comparatively less disturbed than those during the preceding month. There were 10 quiet days, 20 days of *small* disturbance, and 1 day of *moderate* disturbance as against 9 quiet days, 14 days of slight disturbance and 8 of moderate disturbance during the month of July 1939.

The most disturbed day in July 1940 was the 13th on which day a moderate magnetic disturbance was recorded. The quietest day during the month was the 17th. The characters for the individual days are shown below.

Quiet days	Disturbed days	
	Slight	Moderate
2, 7, 8, 11, 12, 17–20, 23	1, 3–6, 9, 10, 14–16, 21–22, 24–31	13

There was one moderate storm during the month as against 5 moderate storms during July 1939. The mean character figure for the month is 0.71 while that for July of last year was 0.97.

M. R. RANGASWAMI.

SEISMOLOGICAL NOTES

During the month of July 1940, one slight and three moderate earthquakes were recorded by the Colaba seismographs as against two slight ones recorded during the same month in 1939. Details for July 1940 are given in the following table:—

Date	Intensity of the shock	Time of origin I. S. T.		Epicentral distance from Bombay Miles	Co-ordinates of the epicentre (tentative)	Remarks
		H.	M.			
July 10	Moderate	11	20	3330	In or near Korea.	* Owing to strong microseisms the different phases of this shock could not be determined with sufficient accuracy from the Colaba seismograms. It was reported in the papers that 300 persons were killed, several hundred injured and 12 villages were destroyed.
14	Moderate	11	23	5740	Near 52° N., 177° E. in the neighbourhood of Aleutian Islands.	
21	Moderate	21	09	3470	7° N., 123° E. to the south of Mindanao Island.	
30	Slight	05	42	2460	Probably Anatolia.*	