



Patrika

July 1984 No. 8 Newsletter of the Indian Academy of Sciences

Golden Jubilee

As mentioned in previous issues of *Patrika*, several programmes of scientific interest have been organised for the Golden Jubilee Year. Special Golden Jubilee Numbers of *Pramāṇā*, *Proceedings—Chemical Sciences and Animal Sciences* and the *Bulletin of Materials Science* were published in April–May and *Proceedings—Plant Sciences and Earth and Planetary Sciences* in July–August, 1984.

The Golden Jubilee Meeting will be held at Bangalore from 7 to 11 November 1984. Over 350 Fellows and Young Associates are expected to attend the Meeting, as also several distinguished scientists from abroad, who will be giving lectures in the various symposia.

Prof. S Chandrasekhar, University of Chicago, will deliver the Golden Jubilee Lecture, during the inaugural function on 7 November 1984, on "Pursuit of science: its motivations".

Four symposia on (i) Supernovae, neutron stars and black holes, (ii) New trends in computers and computing, (iii) Animal communication and (iv) The monsoons, have been organized. In addition there will be lecture presentations by Fellows of the Academy as well as by Young Associates. A Workshop on Supernovae and their remnants will be held, just before the Golden Jubilee Meeting, from 29 October to 2 November at the Raman Research Institute.

The tentative scientific programme of the Golden Jubilee Meeting is given below:

Wednesday, 7 November 1984

Venue: Chowdaiah Memorial Hall

Inaugural Function

Presidential address

Golden Jubilee Lecture by S Chandrasekhar, University of Chicago, on "Pursuit of science: its motivations"

Business Meeting of Fellows

Special Lecture

M GK Menon, Planning Commission, New Delhi

Unveiling of Ramanujan bust at Raman Research Institute

Thursday, 8 November 1984

Venue: Faculty Hall, Indian Institute of Science

Symposium on Supernovae, neutron stars and black holes

The story of the Crab Nebula—VL Trimble
Neutron stars and black holes—
CV Vishveshwara

Manifestations of compact objects in binaries—
EPJ van den Heuvel

Physical processes around black holes—
R Nityananda

Quasars—G Swarup

Special Lecture

The most rapidly rotating stars—G Srinivasan

Friday, 9 November 1984

Venue: Faculty Hall, Indian Institute of Science

Symposium on Animal communication

On the communication of well being—
M Gadgil

Communication, social behaviour and
patterning in the cellular slime moulds—
V Nanjundaiah

Trade-offs in the evolution of frog
vocalizations—AS Rand

Communication of kinship in social insects—
R Gadagkar

Communication and synchronization of
biological rhythms in insectivorous bats—MK
Chandrasekaran

Special Lectures

Neurogenetics of chemical senses—O Siddiqi

Hydrodynamic instabilities in liquid crystals—
S Chandrasekhar

Excursions into multiphase reactions—
MM Sharma

Saturday, 10 November 1984

Venue : Faculty Hall, Indian Institute of Science

Symposium on The monsoons

Dynamics – P J Webster

Predictability – J Shukla

Variability – Sulochana Gadgil

Special Lectures

Gene basis for drug metabolism –

G Padmanaban

Oncogenes: their function – LC Padhy

Biomimetic model reactions in

photosynthesis – V Krishnan

Electron density in chemistry – SR Gadre

Structure, conformation and charge density

studies by X-ray diffraction – TN Guru Row

Sunday, 11 November 1984

Symposium on New trends in computers and computing

Trends in programming languages and programming – P Henderson

Trends in artificial intelligence and knowledge – R Narasimhan

Trends in LSI/VLI/microprocessors – Virendra Mohan

Next generation of computers – R Arvind

Special Lectures

The role of atmospheric carbon dioxide in controlling the earth's climate – D Lal

Adventures in solid state chemistry – CNR Rao

A small illustrated book on the "History of the Academy" is being prepared and will be presented to all the participants as a memento on the occasion of the Golden Jubilee. Three cultural programmes which will include music, dance and drama have been planned for the Golden Jubilee week.

Professor Satish Dhawan is Chairman of the Reception Committee. A local organising committee with Prof. R Narasimha as Chairman has been looking after the organisation of the Meeting.

The Academy is particularly anxious that all its Fellows and in particular all the Foundation Fellows should attend this meeting. The Foundation Fellows will be special guests of the Academy and the Council has decided that every Foundation Fellow could bring a companion whose travelling expenses will be met by the Academy. The travel expenses of all Fellows attending the Meeting who are not able to obtain travel support from other sources, will be met by the Academy as in previous years.

During the period of the Annual Meeting of the Academy, the Chairmen of the Editorial Boards will also convene meetings of their respective Editorial Boards to discuss matters relating to the Academy journals.

Journals – Golden Jubilee Numbers

Amongst the many activities undertaken by the Academy towards the achievement of its goals, publications have taken the pride of place since the inception of the Academy and continue to do so. In addition to its Proceedings which have appeared without interruption since July 1934, the Academy has published a large number of books, monographs and in more recent years, a number of specialist journals, now totalling eleven.

To celebrate the completion of fifty years of scientific publishing by the Academy, all its journals are bringing out special issues. The Proceedings – Animal Sciences published a Golden Jubilee Number in April. Pramānā published one special issue in March–April and plans to bring out a second special issue in September. This became necessary because of the very enthusiastic response of the scientific community both in India and abroad to the invitation from the Chairman of the Editorial Board to contribute articles for the special issue. Similarly the Bulletin of Materials Science published a Golden Jubilee Number in May and plans to bring out a second issue in September. In addition to the excellent papers by Indian scientists, the paper by V A Kuznetsov, I P Kuzmina and IM Sylvestrova deserves special mention.

Two special issues of Proceedings – Chemical Sciences were published in April and May and a third issue is expected to be published shortly. Many distinguished scientists from India have contributed articles and they represent some of the most advanced fields in which there is considerable activity in the country. There are also papers by scientists from abroad, the most notable among them being that by Dorothy Hodgkin on X-ray and neutron diffraction studies of the crystal and molecular structure of the predominant monocarboxylic acid. This is followed by a series of three papers from her laboratory on similar studies. Another paper of interest is that by G F Gasparri, M Nardelli and F Fermi on structural research on non-transition metal double nitrites.

The Journal of Astrophysics and Astronomy has already published two special issues, in March and June 1984, containing articles from astronomers and astrophysicists of international repute and indicating well the wide range of topics the Journal covers. The next two issues will also contain specially

invited articles to mark the Golden Jubilee of the Academy. The first two issues contain invited papers by S Chandrasekhar, R Hanbury Brown, IS Shklovskii, H Arp, BY Mills and MJ Drinkwater, WC Erickson, JV Narlikar, H Allen, VI Ginzburg and VS Ptuskin, CH Townes, G Herzberg and G Swarup.

All special issues have a distinctive cover.

The special issues which will be published during the second half of the year are Proceedings – Earth and Planetary Sciences, Chemical Sciences (third special issue), Plant Sciences and Mathematical Sciences, Pramānā (second special issue), Bulletin of Materials Science (second special issue), Journal of Bio-sciences (two special issues) and Sādhanā (Engineering Sciences).

The publication of the special issues was made possible by a grant from the Department of Science and Technology to cover their printing cost.

Circulation of Academy Journals

For the last several years, the Academy has been greatly concerned about two aspects relating to the publication of its journals:

- (1) efficient arrangement for their printing and
- (2) improving their circulation.

To improve the quality and efficiency of printing the journals, the Academy has entered into an arrangement with M/s Macmillans, who have advanced facilities for printing and particularly for composing complicated mathematics. From 1984 all the Academy journals are photocomposed at Macmillans, Bangalore and printed by the offset process at their press in Madras. As a result, there has been a significant improvement in the quality of production of the journals.

For improving the circulation of the journals, the Academy has entrusted the international distribution of all Academy journals including Current Science to J C Baltzer A G, Scientific Publishing Company, Basel, Switzerland. The period of the contract is initially 5 years from January 1984.

Steps to improve the circulation of the Journals within the country are now engaging the attention of the Academy.

Proceedings – Animal Sciences

Report by the editors

The Animal Sciences Journal of the Indian Academy of Sciences strives to promote an integrated approach to biological studies through the publication of research papers involving interdisciplinary areas as well as of traditional and basic aspects. However, with the publication of Journal of Bio-sciences which publishes papers in the more recent areas of research in Bio-sciences, increasing attention has been paid to include in every issue of the Animal Science Journal, papers relating to such sub-disciplines as Taxonomy and Morphology, Animal Physiology and Biochemistry, Animal Ecology and Behaviour, Environmental Biology and Toxicology, Fishery Biology, Parasitology, Entomology, Reproductive Biology and Endocrinology. Such an arrangement serves to augment the diversity of reading interest, thereby enabling better dissemination of the journal. A strict refereeing system has provided the much needed quality of the publications on every one of these disciplines.

Of the several areas mentioned above, it has been found on an analysis of the papers published during the three year period, 1981–1983 that four of these areas namely Taxonomy and Morphology, Animal Physiology and Bio-chemistry, Ecology and Behaviour and Environmental Biology and Toxicology contribute to more than 75% of the papers published. Further, the papers published in the above areas of study indicate specialization in the subjects relating to impact of salinity on fishes, their reproductive biology, enzyme biochemistry in animals, studies relating to steroids, sex hormones, histochemistry and cytochemistry, juvenile hormones, nutritional physiology, toxicity to fishes and rodents due to various toxic chemicals including DDT, insecticides, pesticides, and rodenticides, and behavioural studies in relation to food plant preferences especially in insects, sufficiently reflecting the trends for an interdisciplinary approach to biological studies. Among the papers on Taxonomy and Morphology, the tendency has been to include papers which involve revisionary studies on groups with discussions on phylogenetic trends rather than merely to describe an odd species or two. From the morphological viewpoint the trend has been to emphasise functional morphology. More recent disciplines are emerging, such as

Bioenergetics, Biorhythms, etc., and these also find a place, though much restricted in their number. There is a dire need for an increase in contributions in these areas of research.

Though Entomology has been cited as an area, by itself it is a major discipline and the inclusion within this discipline of publications relating to biological control of insects, ecobehaviour, social insects, insect-host plant interactions as well as insect-fungal interactions indicates the wide array of approaches in entomological studies which should naturally attract more papers in the near future.

Sādhanā

The new section of the Proceedings devoted to Engineering Sciences (see Patrika No. 5), which was first published in 1978, now bears a new name, Sādhanā. The word from Sanskrit is familiar to Indian readers. Apte's well-known dictionary lists among its meanings 'accomplishment... proof... instrument or tool' all conveying that sense of physical achievement that is central to successful engineering.

Sādhanā editorial policies will remain the same as the Proceedings—Engineering Sciences have followed since their founding in 1978 and as they have been stated on the inside cover of all the issues.

Additions to the Academy Building

The additions to the Academy building have been completed and both the offices of the Academy and Current Science, temporarily housed in 'Panchvati' for two years, will move into its new premises in August 1984. The additional floor and the staircase block have increased the space by about 325 square metres and provide badly needed additional accommodation for the staff of both the Academy and the Current Science Association and for the editorial and other activities which have increased manifold in the last five years.

Obituaries

Basil William Anderson, one of the world's leading gemmologists, passed away on 24 February 1984. Perhaps the greatest of the pioneers of this specialized science, his contributions to the greater understanding of gems and to trade integrity have been exceptional.

Born in South London on 3 July 1901, he was educated at Sedbergh School in Yorkshire and in King's College, London, where he obtained an Honours degree in Chemistry, with Geology as his subsidiary subject.

In the early 1920's when Japanese cultured pearls were seriously beginning to contaminate the Bombay 'bunches', the normal source of matched and drilled pearls for western markets, the London Chamber of Commerce established the world's first independent gemmological laboratory, with Anderson as a full-time gemmologist. He was its Director for 46 years till his official retirement in 1972.

During and after the depression in 1929, he with Payne, developed refractometers for testing diamonds, blende and spinel. He next turned his attention to absorption spectroscopy and assisted by Payne, pioneered its use in the identification of gems. In the late thirties he made a very considerable contribution to the parent science of mineralogy. He determined exhaustively the physical constants of all known gem minerals in their cuttable qualities, discovering two new minerals in the process.

His book "Gem Testing for Jewellers" was first published in 1942, one of the most valuable and most lucid of all textbooks on the subject. A second book "Gemstones for Everyman" appeared in 1976.

In 1977 Anderson was made a Fellow of King's College. The Anderson/Bank Prize and Anderson Medals were instituted by the Gemmological Association of Britain in honour of Anderson's eightieth birthday.

An immensely popular, generous-hearted and friendly man, he was held in high esteem and in very real affection by all who knew him.

In the passing away of **V Ramanatha Ayyar**, the Academy has lost a distinguished Fellow and the country a pioneer in cotton genetics and breeding. Born on 17 October 1892 in North Arcot district in Tamil Nadu, he obtained his Diploma in Agriculture from the Agricultural College, Coimbatore in 1916, when he won the Clogstown and Keess medals for scoring the highest marks. His

physics. One of the world's leading physicists, his was a life of intense devotion to science, unchanged by the various vicissitudes and personal tragedies in his life. In his death we have lost a very great scientist, a great human being and a true friend of India.

Pyotr Leonidovitch Kapitza was born on July 9, 1894 at Kronstadt in Russia. His father was a military engineer and his mother worked in higher education and folklore research. He graduated from the Petrograd Polytechnical Institute in 1918 and began his scientific career in Academician Ioffe's famous Electromagnetics department. Here, jointly with Semenov, he proposed a method for determining the magnetic moment of an atom interacting with an inhomogeneous magnetic field. This method was later used in the celebrated Stern-Gerlach experiments.

At the suggestion of Ioffe, Kapitza came to the Cavendish Laboratory at Cambridge in 1921 to work with Lord Rutherford. In 1923 he made the first experiment in which a cloud chamber was placed in a strong magnetic field and observed the bending of alpha particle paths. In 1924 he developed methods for obtaining very strong magnetic fields and produced fields up to 320 kilogauss (32 tesla) in a volume of 2 cubic centimeters. In 1928 he discovered the linear dependence of resistivity on magnetic fields for various metals placed in very strong magnetic fields, discovering the linear and the quadratic magneto-resistance in metals. Realizing that these studies could be done better at low temperatures his last years in Cambridge were concentrated on low temperature research. He began with a critical analysis of the methods that existed at the time for obtaining low temperatures, and developed a new and original apparatus for the liquefaction of helium based on the adiabatic principle.

Kapitza was a Clerk Maxwell student of the Cambridge University from 1923–26 and assistant director of magnetic research at Cavendish Laboratory from 1924–32. He was Messel Research Professor of the Royal Society from 1930–34 and in 1935 became the first Director of the newly built Royal Society Mond Laboratory in Cambridge. At the inauguration of the Mond Laboratory in 1930, he explained the crocodile motif on the archway in the following words "The creature has an unusual character. Once it gets a bite on something, it does not slacken until the object is consumed, this is the tenacity needed in scientific research". Kapitza exhibited this passion for science both in his professional and personal life.

Kapitza visited USSR in 1934, but was not allowed to return to Cambridge. He then

organised the Institute of Physical Problems, a new laboratory specially built for him in Moscow. There he continued his research on strong magnetic fields, low temperature physics and cryogenics. In 1939 he developed a new method for liquefaction of air with a low-pressure cycle, using a special high-efficiency expansion turbine. In low temperature physics, Kapitza began a series of experiments to study the properties of liquid helium, that led to his discovery of the superfluidity of helium in 1937 and in a series of papers investigated this new state of matter.

During World War II Kapitza was engaged in applied research on the production and use of oxygen, that was made by using his low-pressure expansion turbines and headed the Department of Oxygen Industry attached to the USSR Council of Ministers.

Late in the 1940's Kapitza turned his attention to a totally new range of physical problems, viz., plasma physics, as his refusal to work on nuclear weapons development had barred him from the Institute of Physical Problems. He invented high-power microwave generators, the planotron and nigotron (1950–55) and discovered a new kind of continuous high pressure plasma discharge with electron temperatures over 106 K.

He was reinstated as the Director of the Institute of Physical Problems in 1957 and started a new section on fusion research, which was to occupy his attention from then on, with his son Sergei, an accelerator physicist.

Like Ioffe and Rutherford, Kapitza had a group of brilliant young colleagues in his Institute, Landau, Lifshitz, Peshkov and Melkov among them. He established a tradition that everyone, Academicians as well as new students, worked in the laboratory. He is said to have remarked 'I want experiments done with the wisdom and patience of my academicians and not by proxies and substitutes'.

He obtained financial support for science by arguing with his Government as in the following excerpt "you should not value the painting Mona Lisa by calculating the quantity of paint used and its cost, the area of the canvas cloth and its cost, the weight of the wooden frame and its cost and so on. If an accountant does this, he is terribly wrong. The value of Mona Lisa is immeasurably more than the cost of the paint, canvas, wood and other materials used. Such is the situation for any successful effort in science. Its value is immensely more than the roubles given as salaries or spent in the laboratories".

In 1957 Kapitza became a member of the Presidium of the USSR Academy of Sciences. He was one of the founders of the Moscow

VP Rao, a distinguished entomologist and specialist in biological control, passed away on 19 December 1983 at Bangalore.

Born in 1910, he obtained the MA degree from the University of Madras in 1933 and started his entomological career soon after, working on the coding moth and fluted scale at the Banaras Hindu University. He also studied the biology, morphology and various other aspects of *Pulvinaria maxima*, for which he was awarded the DSc degree in 1942. He visited the USA in 1947–48 and worked on the taxonomy of scale insects with Harold Morrison and GF Gerris. He joined the Directorate of Plant Protection in 1948 and was Quarantine Entomologist and later Assistant Director (Plant Quarantine) until 1955. He was closely associated with WF Sellers in the establishment of the Commonwealth Institute of Biological Control, Bangalore in 1955. He was Entomologist-in-charge of this station from 1956 to 1973 and the CIBC sub-station, Kumasi, Ghana, from 1973 to 1975.

His interests were varied and included several different groups of agricultural and forest pests. He was the second President of the International Organisation for Biological Control, South-Eastern Asian Regional Section and the Chairman of the Scientific Panel for Entomology and Nematology of the Indian Council of Agricultural Research at the time of his death. He was elected a Fellow of the Academy in 1959.

He was a keen philatelist and photographer. As an active life-member of the Karnataka Philatelic Society he assiduously built up a unique collection of stamps depicting birds and mammals.

He is survived by his wife, two sons and two daughters.

V. S. Venkatasubramanian passed away at Bangalore on 22 July 1984. In his untimely death, the country has lost a dedicated and outstanding scientist. Venkatasubramanian was one of the few physicists in the early fifties, who applied nuclear physics to the elucidation of long term geological processes. With his innovative genius, he built the first mass spectrometer in the country for isotropic studies in rocks and minerals. His application in 1953 of the radioactive decay of rubidium into strontium for the time of formation of mica samples from Kerala, will rank as one of the earliest attempts in the world in developing what has proved to be a very powerful tool for geo- and cosmochronology. He pursued geochronological research using different decay schemes with a crusading spirit and produced the first definitive picture of the temporal evolution of the classic terrain of

Karnataka. That all this was achieved without any training abroad and is yet to be matched by anyone in the country is eloquent testimony to his scientific genius and dedication to his work.

Impressed by his achievements, H E Duckworth of McMaster University invited Venkatasubramanian in 1960 to his laboratory. After his return in 1962 he built improved mass spectrometers for research in both physics and geology. His breadth of interest ranging from sulphur isotopes in ore minerals to plasma diagnostics and ion implantation was truly amazing. His lectures, whether in physics or geology, were striking for their depth, clarity and precision. The comprehensive range of analytical facilities in the Central Instruments Laboratory of the Indian Institute of Science, Bangalore is the result of his meticulous planning and management, backed up by keen personal involvement. He had just completed a book on materials science for advanced students before his death.

Born in 1930 near Palghat, Venkatasubramanian obtained his BSc (Honours) degree in Physics from the Madras University and joined the Physics Department, Indian Institute of Science in 1950. He was elected a Fellow of the Indian Academy of Sciences in 1978, was awarded the prestigious Mysore Geologists' Association Gold Medal in 1981 and the coveted Decennial Award in 1982 by the Indian Geophysical Union for his pioneering contributions to Indian geochronology.

He leaves behind his wife and daughter. For them as well as for his many friends, admirers and students, his sudden passing away is an irredeemable loss.

Indian Academy of Sciences

List of papers published in Proceedings—Animal Sciences
January 1977 to December 1983

Annexure to
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Volume 86 (1977)

Development of the foetal membranes in the Indian horse-shoe bat, *Rhinolophus rouxi* (Temminck); DA Bhiwgade. Foetal membranes and placentation in vesperilionid bat, *Scotophilus heathi* (Horsefield); PA Ramakrishna and A Madhavan. A preliminary study of the insect fauna of Meghalaya, India. 12 species of the genera *Tabanus* L. and *Haematopota* Mg. of the family Tabanidae (Diptera); M Datta and S Biswas. On two frogs of the family Microhylidae from Andamans including a new species; RS Pillai. Neurochemical correlates of aestivation: changes in ganglionic protein metabolism in Indian apple snail *Pila globosa*; Indira Singh and Nayeemunnisa. Length-weight relationship of a carp, *Labeo bata* (Ham.); A Chatterji, AQ Siddiqui and AA Khan. Oxygen consumption and ammonia excretion in the catfish *Mystus armatus*, with special reference to swimming speed and ambient oxygen; N Sukumaran and MN Kutty. *Sarcophaga ruficornis* Fabr. (Sarcophagidae: Diptera) as a parasite of the common Indian toad; Pranabesh Roy and B Dasgupta. Thermal relations of the Indian leech, *Poecilobdella viridis* (Blanchard); R Nagabhushanam and GK Kulkarni. A new genus and a new species of Neuroptera (fam.: Hemerobiidae) from India; SK Ghosh. Observations on the morphology and sporogony of a coccidian *Adelina rayi* n.sp. from the gut of the centipede *Rhysida longipes*; CC Narasimhamurti. Fecundity and its role in racial studies of *Gudusia chapra* (Pisces: Clupeidae); SL Chondar. On the functional anatomy of the salivary systems of *Purana tigrina* Walk. (Homoptera: Cicadidae); David Livingstone. Zoo geography of Indian freshwater fishes; KC Jayaram. Esterases in trematodes: 1. Nerve arrangement and distribution of esterases in *Singhiatrema longifurca* and *Paradistomoides orientalis*; Shyam Sunder Simha and L Narasimha Rao. Neurosecretion in the fresh water prosobranch, *Pila virens*. I.—Neurosecretion in the normal and aestivating snails; R Shylaja and KM Alexander. Food preferences of the Indian mole rat *Bandicota bengalensis* (Gray); Arshad Kamal and Jamil Ahmad Khan.

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A new genus of foraminifera from the cretaceous rocks of South India; S Sambe Gowda. Nematode parasites of the slender loris, *Loris tardigradus*; RV Krishnamoorthy, K Snehari, Hafeezur Rahman and GL Rajasekharaiah. Distribution and abundance of earthworms in Bangalore; Radha D Kale and RV Krishnamoorthy. Oxidation of glucose-U-¹⁴C and synthesis of glycogen in different tissues of the garden snail, *Cryptozona ligulata* with reference to aestivation and starvation; S Krupanidhi, K Raghavaiah, B Padmanabha Naidu and R Ramamurthi. Effect of osmotic stress on parsnervosa and median eminence of *Columbia livia* (Gmelin); SS Hasan and K Chandrasekhar. Influence of atmospheric conditions and soil temperature on the prevalence of the lance nematode (*Hoplolaimus indicus* Sher, 1963) in rice fields; KV Ramana, JS Prasad and Y Seshagiri Rao. Seedling blight of sugarcane—A new disease caused by *Drechslera* state of *Cochliobolus spicifer*; DV Narendra, Shantha D' Urs and MVN Setty. Functional morphology of the masticatory muscles of *Mus musculus* L.; N G Patel. Effect of thuricide on rice stem borers; P Nayak, PS Rao and SY Padmanabhan. Ecology of fouling bryozoans at Visakhapatnam harbour; K Satyanarayana Rao and PN Ganapathi. Effect of texture on the food preferences of bait-shy wild rats (*Rattus rattus*) L.—II; Devendra Bhardwaj and Jamil Ahmad Khan. The annual reproductive behaviour of the green frog, *Rana hexadactyla* Lesson, in and around Mangalore and Mysore City (India); M Gopalakrishnan and MR Rajasekarasetty. Early development, implantation and amniogenesis in the Indian vampire bat, *Megaderma lyra lyra* (Geoffroy); A Gopalakrishna and MS Khaparde. Palaeontology of the Bagh Beds—Part V. *Ostreina*—II; CW Chiplonkar and RM Badve.

Life tables for the gram pod borer, *Heliothis armigera* Hubner (Lepidoptera: Noctuidae) on pea; GG Bilapate and VM Pawar. Pollutional studies of few rivers of Western Uttar Pradesh with reference to biological indices; SR Verma, AK Tyagi and RC Dalela. Purified haemocyanin in the blood of fresh water amphibious snail, *Pila globosa* (Swainson) in relation to aestivation: M Venugopal Reddy, S Krupanidhi, V Venkata Reddy and B Padmanabha Naidu. Culturing *Ariophanta madraspatana* (Gray) in the laboratory for pesticide bioassay; M K Krishnakumar, K Mukhta Bai and SK Majumder. Effect of the epidermal secretions of Hemichordate *Ptychodera flava* on growth of *Amphora coffeaeformis* and *Cyclotella meneghiniana* (Diatoms); Jayapaul Azariah, VNR Rao and VT Sridharan. Sex ratio of the soil isopod, *Porcellio laevis* (Latreille) in Delhi region; GA Nair. A new record of rare spider of the family Dinopidae from India with description of a new species; BK Tikader and MS Malhotra. A new species of *Dicyemenea*, *D. coromandelensis* n.sp. from *Sepia elliptica* Hoyle; C Kalavati, CC Narasimhamurti and T Suseela. Excretion of lactic acid in exercised fish *Tilapia mossambica*; N V Karuppannan and MN Kutty. A new frog of the genus *Micrixalus* Boul. from Wynad, S India; RS Pillai. Development of the foetal membranes and placentation in the Indian false vampire bat, *Megaderma lyra lyra* (Geoffroy); A Gopalakrishna and MS Khaparde. Sexual maturity and breeding behaviour in the freshwater crab, *Barytelphusa guerinii* Milne Edwards; MS Gangotri, N Vasantha and SAT Venkatachari. Histomorphological studies on the brain neurosecretory profile of Indian leech, *Poecilobdella viridis* (Blanchard); R Nagabhushanam and GK Kulkarni. Assay of some systemic insecticides against *Hyadaphis erysimi* (Kalt.) on *Brassica campestris* L. var. sarson Prain; DN Vaidya, SF Hameed and NP Kashyap. Life table for the castor capsule borer, *Dichocrocis punctiferalis* Gn. on different hosts; GG Bilapate. Contributions to the study of bagrid fishes—14. The systematic position of the species of *Mystus scopoli* known from China; KC Jayaram. Population genetics of *Drosophila nasuta nasuta*, *Drosophila nasuta albomacana* and their hybrids—II. Coassociation of parental chromosomes in the hybrid populations; MR Rajasekarasetty, NK Krishnamurthy and HA Ranganath. Two new species of spiders of the family Lyssomanidae from India; BK Tikader and Bijan Biswas. Growth and protein efficiency ratio in albino rats—a statistical approach; D Rajalakshmi and BS Ramesh. Establishment of home range, intra-specific and interspecific relations in rhesus monkeys (*Macaca mulatta*) under infant-infant rearing conditions; Raghubir Singh Pirta and Mewa Singh. Changes in chemical composition during growth of *Clarias batrachus* (Linnaeus); Yagana Bano. Retrieval of young by lactating Indian gerbil, *Tatera indica indica* (Hardwicke); P Vasanta Kumar and Jamil Ahmad Khan. New genera and species of Eurytomidae (Hymenoptera: Eurytomidae); BR Subba Rao. Changes in the proximate chemical composition and nutritive value of the freshwater murrel, *Ophicephalus punctatus* Bloch during storage; Ishraq Ahmad. Larval trematodes. Part II. On two new cercariae from *Indoplanorbis exustus* (Deshayes); Sarla Srivastava. Volume regulation in a euryhaline oligochaete, *Pondodrilus bermdensis* Beddard; BVSSR Subba Rao. Biometrical analysis of growth in the larvae of *Heliothis armigera* Hubner; GG Bilapate, VM Pawar and AK Raodeo. A new species of the genus *Durgades* Dist. of the family Agallidae (Homoptera Cicadelloidea); P Kameswara Rao and Usha Ramakrishnan. Effect of median eminence mediated cortisone and cole stress on pituitary histology; NS Leela. On the growth rate of the ovary of *Eyprepocnemis alacris alacris* (Serville) during post embryonic development (Orthoptera: Acrididae); MC Muralirangan and TN Ananthkrishnan. Effect of malathion on free amino acids, total proteins, glycogen and some enzymes of pelecypod *Lamellidens marginalis* (Lamarck); I Kabeer Ahmad, Md R Begum, S Sivaiah and KV Ramana

kao. A comparative study of haematology of three air-breathing fishes; M Ramaswamy and T Gopalakrishna Reddy. Population dynamics of the dusky cotton bug *Oxycarenus laetus* Kirby in relation to climatic variation (Heteroptera: Lygaeidae); K Thangavelu. Three new species of gregarines from termites; C Kalavati and CC Narasimhamurti.

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