

University of Ceylon Review

Vol. VII No. I

January, 1949

Zoology in Ceylon¹

PERHAPS the most noteworthy advance in the field of Education during the past decade is the importance stressed on Biology in the general curriculum of the young individual. Biology, we know, is the Science of Life, but no longer is the study of this science dismissed with a passing mention of animals, plant life monopolizing the scene. It is divided into Botany and Zoology, Zoology occupying a place equal with the other sciences. This is the position in an industrial country like England ; but it is a regrettable fact that in an agricultural country like Ceylon, Zoology is yet an unfamiliar subject. Hardly any progress seems to be made in teaching it ; on the other hand it almost appears that in Ceylon the study of Zoology is being systematically relegated to an obscure position.

The reason for this is not far to seek. Opposition to it comes from two sources, firstly from people who having but a meagre knowledge of Zoology believe that the same quantity of scanty knowledge which was imparted to them when young, would suffice students for all time and all generations in this progressive world. Secondly, it comes from some Educational Authorities who have no knowledge of Zoology at all. From whatever aspect we view the problem, the first category of opponents is as dangerous as the second ; but the result is always the same—a cramping of general education and a reversion to the dark ages.

The purpose of teaching the young student Zoology is to inculcate in his mind the spirit of critical inquiry by practical study. He is introduced to the beauties of Nature and Nature's Laws with their complex interpretations. Life he sees in its proper perspective. Superstition is driven out of his mind and the broad field of enquiry is open for full entry. That is culture. " Nature never did betray the heart that loved her ".

One simple example might illustrate my theme. Zoologists know that the wasp goes in search of caterpillars or spiders, paralyzes them and brings them to a nest already prepared of mud. Such nests are a common sight on walls. Then the wasp deposits an egg upon the victim or, lest its movements endanger the young grub, suspends the egg by a thread and closes the nest.

1. An Inaugural Address delivered at King George's Hall on July 29th, 1948.

A young larva hatches out of the egg, feeds on the victim and within the protected mud cell is transformed into a young wasp. Such is the Zoologist's interpretation of the life-history of a common insect ; it only needs careful observation in the field and the opening of a few cells to watch the progress of the young insect. However, in marked contrast is the version in this country, according to which the wasp, a barren or sterile female, adopts another animal—a caterpillar. She protects her adopted child in a special home and by some mysterious force transforms the butterfly larva into one of her image and likeness—a wasp. This is the symbol of Mother-love, and wasp's cells are protected in many homes, however unsightly they appear. It is obvious that in this case false sentiment and incorrect interpretation of religious laws are partially responsible for stifling the spirit of scientific enquiry. It would be rather unfortunate if our authorities systematically attempt to send back our youth to such antiquated notions.

It would be interesting now to examine briefly a few more observations that have been made on common Ceylon animals ; microscopical forms and marine animals, which are not of any economic importance, had little attraction for our people.

A very progressive branch of Zoology today is Parasitology, but the existence of parasites, plant or animal, was known to the people of Ceylon. According to the English writer Bennett, there is a saying in Ceylon that "a foreigner and a parasite plant are synonymous. One is as ruinous to the place he inhabits, as the other to the tree it embraces". The harm done by animal parasites to our people must have been great ; parasitic worms are mentioned in the *Cūlavamsa*. The physician—king Buddhadasa, was undoubtedly a great parasitologist ; but the historian, a non-biologist, let his imagination fly high and in his anxiety to extol the virtues of his hero-King, magnified the dimensions of the parasitic worm. One would almost dismiss as fiction an account in which a worm assumes the dimension of a snake. Two examples from the *Cūlavamsa* would suffice.

"A bhikkhu on his mendicant round in the village of Thusavaṭṭhika had been given only dry mendicant's food. Then when he went begging for milk he got milk with worms in it which he drank. In his belly the worms multiplied and fed in his bowels. Then he went and told the King. The King asked : ' At what meal did this pain arise and of what kind is it ? ' The other answered : ' At the meal that I took with milk in the village of Thusavaṭṭhi '. The King recognised that it had been milk with worms in it. Now just at that time a horse had to be cured by bleeding. The King himself bled it, took the blood, gave it to the samana to drink and spake, waiting a moment : ' That was horse's blood '. When the samana

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heard that he vomited. The worms came up with the blood, the bhikkhu was cured, but the King showed his joy. 'By a single stroke of the knife, worms, samana and horse have been cured: excellent of a truth are my activities as healer'.² We have here in brief the ancient idea of one method of parasitic infection. But when we read the next record we may feel surprised: 'A man in drinking water swallowed the egg of a water snake; out of it there came a water snake. It sucked itself fast in his inside. Tortured by the pain caused by this he sought the King. The latter asked as to the cause. He recognized that a reptile was within him, made him fast a week and had him, after being bathed and rubbed with oil, laid on a well prepared bed. Now as he lay there in deep slumber with open mouth, he placed before his mouth a piece of meat with a string attached. (Lured) by the smell the reptile came out of him, bit fast at it and wanted to crawl in (again). Thereupon the King held it fast by means of the string, drew it out, threw it in a jug of water'...³ The reptile obviously is a parasitic worm, the rest needs no comment.

Perhaps the most interesting branch of Zoology is Entomology—the study of Insects, and Ceylon has plenty of them. In the West the child is introduced to the broad subject of life with the study of simple Insects, like Butterflies and Dragonflies, but in Ceylon it is neglected.

The Leaf-Insect, which hatches out from eggs like any animal, is said to be a transformed leaf. In fact the Sinhalese see every stage of transition between leaf and insect, but scientific observers have failed to confirm them. Earwigs, with their pincer-like abdomen, haunt dark places, perhaps under leaves and tree trunks but occasionally fly into human dwellings. Here they find their way into dark corners, perhaps under mattresses, where in many houses live the bed bug. In accordance with the local methods of interpretation, the bed bug is believed to metamorphose into an Earwig. The Cicada next invites our attention. The shrill voice of these Insects make them objects of considerable interest. The Greeks knew about them: that only the male sings. This was expressed in the saying "Happy the Cicadas' life, for they all have voiceless wives". The Cicada is a classic of misinterpretation of animal habits. In the old philosophic way the Sinhalese say that the Cicada sings and sings till it bursts. Two observations have been made, the singing insect and the cast-off skin, the rest is mere poetry. However the life-history of a Cicada is no longer a mystery. Cicadas are of economic importance in that they suck plant juices. The females, attracted by the singing males, fly to them and mate. They lay their eggs on twigs, which on hatching produce nymphs. These jump and fall on the ground, where they burrow in the soil

2. XXXVII, 124-131.

3. *Ibid.* 132-137.

and live underground for from three to seventeen years-feeding on roots. On emergence, they seek a convenient tree or grass stem and attach themselves firmly. The body splits along the back and winged adults emerge, which fly away. It needs a trained zoologist to elucidate such a life-history.

It is very difficult to interpret in modern language the *Cūlavamsa* account of the life-history of the Frog. "A young man was drinking a little water in which were frog's eggs. An egg penetrating by the nostril entered his skull. It opened and was a frog; it grew and dwelt there. At the approach of the rainy season the young man was greatly tortured by it. The King split the skull, took out the frog, put the parts of the skull together again and cured the young man at once".⁴ In this account we have a good mixture of fact and fiction.

I can enumerate accounts of butterflies, birds, reptiles and mammals. All point to a few fundamental errors, *viz.* lack of personal observation, an aversion to verification by dissection, the two intermixed with superstition and the love of folk tales evidenced by the people of this country.

It is very curious that in these modern times, there are people in Ceylon who still adhere rigidly to the Law of abstinence from killing. Killing for sport is a crime, but there are occasions when life may be destroyed for useful purposes. It is permissible for pursuance of knowledge. If the law is pursued to its logical conclusion it might result in the very annihilation of human life. When our aversion to killing is examined critically, then treating humans for malaria, amebic dysentery, ankylostomiasis and so on would mean the death of a host of tiny animals. Oiling streams spreads death among mosquito larvae. With D.D.T. or Gammexane we massacre hosts of insects. Do not organized fisheries mean the supply of food fish to people? The countless fish lives lost would stagger us. Finally, the science of animal husbandry might help us to increase the yield of milk in our cattle. But it is inevitable that a large number of surplus bullocks would create a new problem. In a country which is rapidly mechanizing transport, these surplus males or undesirable females will have to augment the meat supply.

There are, however, many observations made by so-called "unscientific" men of this land which are a credit to them. In our great enthusiasm to imitate and adopt western methods, we have forgotten or even ignored the Ayurvedic practitioners who have modestly served the people for many generations. Elephantiasis was known in Ceylon, although it is doubtful whether the mode of infection was known; but the Ayurvedic physician treated cases with arsenical preparations. Snails are a favourite remedy for nutritional disorders and we find that they provide a good supply of glycogen, galactogen

4. *Ibid.* 142-144.

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and various vitamins. Our work on the anatomy of the snail leads us to the location of adrenaline in its body and we know that Ayurvedha prescribes snails for asthma. We find a minute parasite of the shrimp having a good quantity of vitamin C in it ; the source of supply seems to be the shrimp itself, and prawns and shrimps are considered good food. According to Bennett " the flesh of the edible turtle is given to cure the abdominal obesity to which children are subject from the effects of a rice diet".⁵ And who will take it seriously that people in this Island do not know the value of a balanced diet when the Vedda laments in a well-known song that there is no meat with which to eat the rice made from Olu seeds, " the game having been driven away? "

The fauna of Ceylon is large and varied, but their study is neglected by the people, who believe that Zoology cannot impart culture. We can forgive them when we know that even great men had erred in that direction. A historian visited the zoologist Dr. Anton Dohrn in his laboratory at Naples, and made some remark to the effect that Zoologists take no interest in the study of history. To this Dohrn retorted that to say so was to assume that history begins with man's advent to earth, whereas in the laboratory the pursuit was ancient history—the study of man's ancestors.

The pioneers in the study of Zoology of this Island are the few administrators who in their leisure hours made a systematic survey of some of the major groups of animals. We may mention the European officials Bennett, Legge and Tennent, and chief among all Dr. E. F. Kelaart. We zoologists will always be indebted to Dr. Kelaart, a descendant of Dutch pioneers. A son of the soil, he was born in 1819 and died at the early age of 41. Having entered the University of Edinburgh, he obtained the degree of M.D., and on his return to Ceylon was appointed an army surgeon. During his leisure hours he studied Natural History. His classic work is the *Prodromus Faunae Zeylanicae* published in 1852. This book he dedicated to an officer of the Army Medical Department, Dr. Andrew Smith, M.D., F.Z.S., "in warm admiration of his unceasing and successful efforts to support and inspire the best interests of the Medical Department of the British Army and to encourage and diffuse Zoological Knowledge". What Kelaart has stated in the preface to his book will remain true for all time. "I felt that I could not employ my leisure hours on a worthier subject or in a more interesting pursuit than the study of the Fauna of my native country. Doctors, like men of every other profession, require some relaxation or recreation ; and in the pursuit of Natural History, even under difficulties, they have one equal, if not superior, to any other mode of relieving their minds from the contemplation of the miseries to which flesh is heir. At all events, no occupation, save the one

5. Ceylon and its Capabilities—J. W. Bennett, 1843. p. 111.

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of giving relief to human suffering, have I found more congenial to my mind than the study of Natural History". That is true culture. Will men like Kelaart ever adorn the professional class of this fair Island?

In Ceylon a crying need would appear to be competent teachers of the subject, and there is also a dearth of specialists in many branches of Zoology—parasitologists, entomologists, systematists, geneticists, histochemists. The rising spread of animal-borne diseases, correlated with modern facilities in air travel, demands entomologists and parasitologists with a thorough basic training in Zoological methods, who could work in co-operation with medical practitioners and specialists in Agriculture or Veterinary Science. We should have a number of systematists, who are specialists in the different groups of Ceylon animals. They should form a central group—a nucleus—with their headquarters in a central Laboratory. To them Medical, Veterinary, Agricultural, or Fishery experts can refer for purposes of identifying any specimens as vectors of disease. The expert identifies the vector, the others study the disease. We shall examine three examples taken from different branches.

If a certain snail is suspected as an intermediate host of a new parasitic trematode of man in Ceylon, it would be a tedious job for one man to tackle in all its ramifications by himself. He could refer to the parasitologist who identifies the worm and gives details of what is known about it or its relatives in other lands. The Malacologist identifies the snail and provides the necessary details about its distribution in this country and also what is known about related species in other places. The medical zoologist could then step in to tackle the bionomics of the disease in relation to man. Finally the medical practitioner undertakes the study of the curative side of the problem. Such is co-ordinated research. The American Journal of Parasitology is a mine of information on this subject. We need not be surprised at the vast strides made in America in this direction. If we must learn from other lands, let us learn the best from them.

My second example refers to Fisheries and I quote from the text-book by Shipley and MacBride, "It is obvious that if a fishery is to be an economic success, the fish must be taken in enormous numbers at a time, and this is only possible if they are caught when they congregate in shoals. That branch of Zoology known as Fishery Science has for its object the determination of the whole course of the life-history of fish of economic value, and of the causes which determine their migrations. Armed with this knowledge, Fishery Science can aid the fisherman by enabling him to find the shoals of fish, and

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also in some cases by protecting the fish against undue depletion of their numbers at critical periods of their lives ; and in this way conserving the ' harvest of the sea ' .”⁶

My third example pertains to Zoological Gardens popularly called Zoos, and will illustrate clearly the importance of team work by specialists. Zoos are concentrated spots where a variety of animals of many lands live and die. While propaganda officers would help to swell the funds, expert keepers and veterinary surgeons are needed to look after the animals. But the educational value of Zoos has always been recognised in all parts of the world. They provide material for general anatomical study and for many aspects of scientific research which will be wasted in the absence of trained Zoologists who could attend on them immediately they are available. In the absence of such a combination of experts, Zoological Gardens will deteriorate into menageries or picnic grounds. A Zoo without a Zoologist would be very nearly like Hamlet without the Prince of Denmark. We have much to learn from England and America in this direction.

The moral to be drawn from these three cases is that team work is a modern essential for scientific investigations ; that our workers should learn the virtue of rising above considerations of personal achievement and frankly admit their indebtedness even to juniors in their own line of work, or to colleagues expert in their own special branches.

Our educationalists should clearly distinguish between theoretical problems and practical applications. It is the latter we need most in this country, whose people are ever in the throes of animal-borne diseases and whose economics and health are intimately bound with Fisheries and Agriculture. Let us take the problem of the study of Vitamin C in animals. For this study we need the microtome, the microscope and a variety of chemicals. We should know the principles of the working of the instruments ; we may know the composition, manufacture or synthesis of the chemicals ; but when we know that they cannot be produced in this country in an economic manner that can stand competition from industrial countries of the world, then we call them theoretical problems. But the practical aspect of it is the Zoologist's sphere : the study of the distribution of the vitamin in animals and in different parts of animals by histochemical methods, of the effect of parasites on the metabolism of normal and scorbutic animals. In the study of the pathological effects of parasites, the problem of absorption of Vitamin C will play a great part. According to a recent writer we give our youth a jaundiced view of life when we limit our scientific curiosity to lifeless matter. It is unnecessary to elaborate this theme but a great desideratum in educational reform in a topsyturvy

6. Zoology—A. E. Shipley and E. W. MacBride, 1920, pp. 495-496.

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country like Ceylon is to strike a proper balance between the physical and biological sciences, in accordance with the greater importance of the latter in this country.

The teaching of Zoology should begin in school at the nursery stage at the hands of good teachers trained in the subject. A good teacher is one who can create in his pupils an interest in the subject. This can only be done by creating in the young mind an interest in Natural History, a love for the animals in his neighbourhood and a knowledge of their habits and life-histories. "He prayeth best who loveth best both man and bird and beast". It would be possible by early training in Natural History to tackle major life problems in a simple manner. I allude to the highly controversial question of Sex Instruction to school children. That the mere allusion to the powdery pollen falling on the face of the female flower starts the complex life mechanism, suffices to explain to the young mind the intricacies of fertilization and development of the human being, is a figment of the imagination. Such an allusion becomes an illusion and the young mind, ever alert to life problems, will find out for himself. With the study of Zoology, we make a direct approach to the subject. The study of the Toad would take children to ponds, where they would find tadpoles, spawn and toads in amplexus. No one should feel embarrassed by such natural observations. The child mind learns naturally the meaning of the difference in sexes, the significance of pairing in animals, growth and metamorphosis. Extend the observations to the study of butterflies, snails and domestic pets, and unconsciously we impart to the child the explanation of the so-called mystery which educational authorities quite justifiably fear to entrust to persons incompetent to teach life problems.

As the child grows, from Natural History he should study the internal anatomy of some common animals. The main purpose of this is to teach him the importance of practical work, the proper handling of tools, and to interpret correctly what he actually sees in his dissection by means of a drawing. If a teacher fails to accomplish this difficult part of his job, Zoology becomes a mere memorizing of names. An ounce of practice is worth a ton of theory.

We now come to the University stage, where Zoology is taught in all its aspects, both theoretically and practically. The student is now introduced to specialization with a more detailed training in such important subjects as Marine Ecology, Parasitology and Entomology. We feel that with such a training the young graduate is ready to take a profession.

The critical outlook which is instilled in him fits him to administrative posts or, with a little training in general teaching methods, he can be a good teacher. There is no better person to take charge of young children than one who knows his subject thoroughly.

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There are other fields in Zoology in Ceylon which our graduates can enter. The complaint is that there is a great dearth of graduates qualified in Zoology. The reason is not far to seek. Zoology is a neglected subject when there is a crying need for zoologists, because there is a want of appreciation of its value to the community and this results in absence of co-operation. No young man wishes to leave the University's portals into a world which cannot employ him. "Work for work's sake" and "Job-hunters" are well-known catch-words, uttered by people comfortably placed in life. But we know that very few people can work on an empty stomach. A square meal and a square deal will help the young man through life.

We train young men to be specialists in their subject and we hope that they will be given opportunities to prove their worth. The proper step was taken recently by an energetic Permanent Secretary who informed us that there is room for Naturalists in one of his departments. I wish the other departments would tell us in equally direct terms what their needs are. If there is a demand we can supply; but it is illogical to demand when the impression abroad is that no demand exists; and it is highly dangerous to plan for supply when the demand is low. However much we may believe in the diffusion of knowledge and culture, we shudder to visualize our youth filling the ranks of the unemployed. In this small Island we need a very close and healthy co-operation between such authorities as are employers and us, the suppliers.

My final task is to touch on the problem of Research in Zoology. Research, like Culture, is a much-abused word in Ceylon, spoken of by many but understood by very few. It is a word which has no meaning here, for it is uttered most frequently by men who have done the least and who systematically attempt to stifle the spirit.

What is research? It is an attempt to widen the frontiers of one's own field of study. How is it accomplished? By work and more work, and less talk. And how are its results made known? Not in administration reports, but by actual publication in Journals of repute. A research worker's abilities can best be gauged by the many papers he has published in foreign journals. The research section should form the major part of a University department, and the importance of a scientific department like Zoology can best be judged, not by the members who would go to swell its staff or the number of students in it, but by the volume of research which comes out of it. Teaching without research is like looking through a lens-less telescope.

It will not be out of place here to make a statement of the research accomplished by my department of Zoology. My predecessor, Mr. Burt, studied the Cestodes of Ceylon. My colleague, Mr. Kirtisinghe, has published papers

in the Ceylon Journal of Science, Parasitology and The Quarterly Journal of Microscopical Science in England. My junior colleague, Mr. Cruzs, has published in the Ceylon Journal of Science, in the Journal of Helminthology in England, and in America in the Journal of Parasitology. Mr. Weerakone's preliminary investigation appeared in the Ceylon Journal of Science. I have the good fortune of having colleagues imbued with the research spirit. For my own part, I consider it my duty to thank my teachers, Mr. Burt and the late Professor MacBride, out of whose inspiration I have published papers in the Ceylon Journal of Science, in the American Journal of Parasitology and in the English Journals—The Quarterly Journal of Microscopical Science, the Proceedings of the Zoological Society and in the Proceedings of the Royal Society.

Publication of papers in foreign journals is the test of a young research worker's ability in Ceylon. By publishing papers outside his country he obtains the necessary stimulus for greater efforts through the criticism of workers all over the world. At the same time it must be realized that we have a Journal of our own which needs support by way of research contributions which would enable us to maintain the standards, if not the very existence of this Journal. Our junior researchers should also remember the economic consideration that it is their Journal which is tendered in exchange for those from abroad, so that if we have nothing to give others we should have nothing to receive from them.

Next to my teachers and to my colleagues, I must speak of my students, of whom I am proud. It is my duty to invest my time and energy in them but I know that the dividends could be high. In the Department of Zoology the carrying out of a piece of research on a simple problem is the duty of the undergraduate. This is true in other parts of the world, such is the fascination of the subject. We Zoologists instil the true research spirit at the earliest possible stage, for we know that it is a difficult task to teach old dogs to bark. Many contributions in Zoology have come out of undergraduate hands in this Department. The research in Zoology which we undertake will cover all branches of the subject—systematics, morphology, parasitology, entomology, embryology, ecology and histochemistry.

A zoologist's life is always a fight against odds. It is a heritage handed down from time immemorial. He is treated always with suspicion, however good his intentions be. The result is a reserve, which is resented by his colleagues. Of the great French Zoologist, Fabre, who is known as the Poet of Science, it is said that "he was far from receiving, from his colleagues at the *lycées*, the sympathy and encouragement which were so necessary to him. Some even went so far as to denounce him publicly, and he was mentioned one day from the height of the pulpit, to the indignation of the pupils of the

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Upper Normal College, as a man at once dangerous and subversive". You will understand the mentality of his persecutors when you know that Fabre's maxim was "Away with repose. For him who would spend his life properly there is nothing like work—so long as the machine will operate".

I must state tonight the position of my department in regard to that important aspect of work—teaching and research. As teachers we have done our duty; as research workers our efforts were frustrated during pre-war days. At that time, more value was placed on the superficial social attributes. At every turn we were discouraged. The slogan was "Ask, and it shall not be given". A great disqualification was that we indulged in research work. The Zoology Department was not considered worthy of a separate existence. Our status changed for the better with the establishment of the University. But unfortunately, though there has been a change of heart, circumstances beyond our control still cramp us.

I appeal to all those interested in the future of this country to give us Zoologists our rightful place in the sun, a Lebensraum, in order to enable us to continue with our research work without interruption. It is absolutely essential for our healthy existence. I know that my appeal will not be in vain, and I can give the assurance that the gratitude of a generation of young zoologists will follow.

The spirit of research only enters the mind that is prepared for it, and Nature always favours the youthful mind. Our responsibilities therefore to the young student are very great, and three things are essential in us trainers of youth for research—a belief in a Supernormal Power or Guiding Force guiding the evolution of the Universe, a high moral standard which is as essential for research work as for culture (the leader must be worthy of his followers: a clean home ensures a clean laboratory), and a working programme of a whole day throughout the week, throughout the month, all the year round with a sacrifice of leisure for labour.

"The harvest truly is great, but the labourers are few".

W. FERNANDO