

(Mass.), *Phortis ceylonensis* (Browne), *Phialucium virens* (Bigelow), *Agiaura hemstoma* (Perorn et Lesueur), *Lirope tetraphylla* (Chamisso et Eysenhardt) and *Solmundella bitentaculata* (Quoy et Gaimard).

phonophores: These include species of Monophyes and Diphyes and a few colonies of Physonecti, the latter occurring in August, September, January and February.

tenophores: They consist of Pleurobranchia and Berœ, occurring in fairly large numbers from September to the end of March. The largest specimen of Berœ found in our samples was 2" x 1".

chæta:

anktonic forms of Nereida occur at intervals all the year round but are very common from September to May. Tomopteris is fairly constant in our catch from September to March.

tognatha:

ie three commonest species of Sagittæ are *S. gardineri* (Doncaster), *S. bedoti* (Beraneck), *S. Bombayensis* (Lele et Gae) and they appear in varying numbers almost throughout the year.

epods:

general survey of Copepods from month to month shows that their peak periods of occurrence are in the months of July and January suggesting thereby two cycles of maxima. They are found in fairly large numbers at the beginning of monsoon and reach their maximum by the end of July, after which the number falls to its minimum by August. From September onwards their population gradually increases again until it reaches its maximum by January of the next year. Some of the commonest species are: *Acrocalanus monachus* (Giesbrecht), *Eucalanus suborassus* (Giesbrecht), *Paracalanus parvus* (Giesbrecht), *Acartia spinicauda* (Giesbrecht), *Centropages dorsispinatus* (Thompson et Scott), *Centropages typicus* (Kroyer) and *Euchæta marina* (Giesbrecht).

pod larvæ:

pepod naupli are found throughout the year.

omatopod larvæ (mostly Alima) are present from August to May and in large numbers in November.

æa of Porcellana occur from November to March with swarms at intervals in December.

æa of Brachyura is collected from August to April in varying numbers.

galopa is taken in small numbers all the year round.

yllosoma of Panulirus is present from December to April, largest number being in January.

rvæ of Prawns are obtained from May to January inclusive. Their number is pre-eminently large first in the months of July and August, and again in November and December.

Tunicates:

Doliolum and Salpa are the chief forms representing this group in our samples and occur from the middle of October to the end of February. In January and February they appear in very large numbers, at times in swarms. They occurred in unusually large quantity once in October 1942.

Our biological year beginning with the onset of monsoon can be roughly divided into the following four periods according to the variations in the catch. During the rainy season, i.e., June-September, our plankton samples are rather poor both in quality and quantity; but after the rains, viz., from October to December there is an appreciable increase in the catch as more and more transitional planktonic organisms like Decapod larvæ, occur in fluctuating numbers. January, February and part of March seem to be the most favourable months of the year for the occurrence of plankton as swarms of a number of groups of organisms appear at frequent intervals. But during April and May there is a considerable fall in the number of the transitional as well as permanent members of the plankton with the result that the samples taken towards the end of May appear to be meagre.

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May 29, 1945.

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### SOME IMPORTANT FEATURES OF THE LIFE-HISTORY OF *STENO- BRACON DEESÆ*—A BRACONID PARASITE OF THE SUGARCANE AND JUAR BORERS OF NORTHERN INDIA

*STENO-BRACON DEESÆ* is abundantly found in sugarcane and juar fields from May to November in the Aligarh District. It is scarcely seen during the remaining part of the year. The male parasites are less active than the females and the percentage of emergence of the former is greater than that of the latter.

The female actively moves on the surface of stems in search of borers. On reaching the exact spot it introduces its long ovipositor into the tunnel, excavated by the borer, and parasitizes it. The egg-laying process is always preceded by the stinging of the host.

The egg-laying process normally does not require more than two minutes. The parasite generally lays only one egg on or close to the body of every host. Under compulsion even nine eggs may be laid in one tunnel within twelve hours. The parasite refuses to deposit eggs on exposed or dead hosts or hosts which have already been stung by another parasite.

Hatching takes place in twenty-three to twenty-six hours at temperatures between 70° F. and 104° F., maximum, the presence of light being necessary. Hatching has taken

place even for incubation provided.

The larva of the sugarcane borer is a fourth instar and requires 10 days for its development. Generally of the host.

The larva of the sugarcane borer is active and moves about during the night. The end of the larva passes through the pupal envelope (dejection of pupa). At this stage it casts its cocoon.

hours' duration of the severe closed wintering off the cocoon. Between fifty and fifty-eight adults is the duration. leaves become total number of egg-laying twenty-two.

During the season of every of long hitherto this or it has parasite longer time during v emergence been recorded month of

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place even after the expiry of the normal time for incubation when higher humidity was provided.

The larva undergoes four moults. Each stadium is of twenty-four hours' duration. After fourth ecdysis, cocoon formation starts which requires twenty-four hours for completion. Generally fourth ecdysis and the exhaustion of the host synchronize.

The larva though inside the cocoon is still active and retains larval form till the beginning of the sixth day after fourth ecdysis. At the end of the sixth day it becomes inactive, passes out faecal matter of brownish colour enveloped within its peritrophic membrane (dejectamenta) and acquires the shape of prepupa. At the termination of the seventh day it casts off the last, i.e., the fifth larval skin. This ecdysis always takes place inside the cocoon. The prepupal stage is of twenty-four hours' duration and ends with the expiry of the seventh day. The prepupa remains enclosed within the last larval skin whose casting off coincides with the process of transformation of prepupa into pupa. The period between fourth moult and the emergence of adults is of seventeen to twenty-one days' duration. The pupa at the time of emergence leaves behind fragments of the cast skin. The total number of days required from the time of egg-laying to the emergence varies from twenty-two to twenty-six days.

During winter, the duration from egg-laying to emergence ranges between forty-six to fifty-eight days at field temperature. In this season the hatching period and the duration of every stage is almost doubled. This aspect of long and short-timed generations has not hitherto been noted in the life-history of either this or its sister species, namely, *S. necevillei*.

It has been observed that the larvae of the parasite in the stored stems of juar take longer time to emerge than those in the field during winter months. Such cases of delayed emergence in the stores and godowns have been recorded at the end of the following month of March. It may be concluded that

the storing is helpful for the repetition of life-cycle of the parasite at the end of winter season every year.

The phenomenon of parthenogenesis is very common during winter and less common in the remaining part of the year.

It has been recorded that the maximum percentage of successful hatching is about 70; while that of emergence of adults from cocoon is above 90; The maximum number of eggs laid by a single female is thirty-two. If a female is forced to lay more than one egg on or near the same host then only one egg is hatched; but on distributing these eggs on separate hosts about 50 per cent. of eggs have been observed to hatch.

The maximum longevity of a parasite both male and female after emergence from the cocoon is fifty-one days. The average longevity of the male is thirty-seven days. This age limit falls down during summer months. The females invariably die soon after they have finished egg-laying. This parasite is very sensitive to unhygienic conditions, hence every care should be taken while breeding it in order to provide healthy environment to achieve good results.

A detailed description of biology, life-history, and morphology of the parasite will shortly be published elsewhere.

The writer is highly indebted to Dr. M. A. H. Qadri for the most valuable and indispensable help and guidance he has received from him while working on this problem. He is also thankful to Prof. M. B. Mirza for permission to use his well-equipped laboratory and for financial assistance.

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## THE I. C. I. RESEARCH FELLOWSHIPS AND THE DELEGATION OF INDIAN SCIENTISTS

AT a luncheon held in honour of the Delegation of Indian Scientists, Lord McGowan, Chairman, Imperial Chemical Industries, reported that the Directors of the Company had offered to provide at nine Universities in Great Britain, eighty fellowships of the average value of £600 per annum to be held by senior workers in various branches of science. He revealed that by way of Excess Profits Tax, National Defence Contribution and Income-tax, the Company paid to the British and Overseas Governments a sum amounting to 12.5 million sterling.

Replying to the toast proposed by Lord McGowan, Sir Shanti Swarup Bhatnagar referred to "The I.C.I.'s partiality to their own country". He pointed out that the Imperial Chemical Industries had two big and

prosperous factories in India and pleaded "for grants on a generous scale for scholarships for scientific research in India by the I.C.I." This suggestion appears to have immediately caught the imagination of Lord McGowan. While agreeing to consider in a friendly way the question of endowing research fellowships in Indian Universities, Lord McGowan assured the members of the Indian Delegation, that the eighty fellowships in the British Universities would be open to Indian scientists in free competition.

This in short is the "inside story" of the I.C.I.'s farsighted and enlightened munificence now extended to the Universities in India. Details of this Fellowship Scheme are published elsewhere in this issue.