manure, (6) destruction of the crop by burning before seeding and (7) by leaving the ground fallow after the selected eradication measures have been completed and then followed with a five-years rotation beginning with a non-leguminous tilled crop.

The seeds of *Cuscuta arvensis* Bey are much smaller in size than berseem seeds and these could be separated by means of suitable sieves. In U.S.A. the separation of dodder from commercial seeds is now generally done by seed companies provided with special cleaning machinery. Three types of cleaners are in use; (1) power driven graders with special screens, (2) the Dosser machine, in which the velvet linings retain the small dodder seed that cannot be screened out and (3) by an electromagnetic process, in which the crop seed is mixed with iron powder. Much of the powder sticks to rough dodder seed which is then drawn out of the crop by magnets.

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Kanpur, U. P.,
July 30, 1948.

Yuncker, T. G., *Mem. Torry Bot. Club*, 1932, **18**, 113-31.

XANTHOMONAS DESMODII-GANGETICII, SP. NOV., UPPAL, PATEL AND MONIZ; A NEW BACTERIAL LEAF-SPOT OF *DESMODIUM GANGETICUM* DC.

THE disease appears as light yellow, watersoaked, round spots on the undersides of leaves of *D. gangeticum* found at Bassein in Thana District where it seems to be localised. It differs from other bacterial leaf-spots on legumes in its host range, morphological, cultural and biochemical reactions. The description of the pathogene causing this leaf-spot is as under:—

Short rods with rounded ends, single or in pairs but never in chains. Capsules present. Motile with a polar flagellum. Gram-negative. No spores and non-acid fast. Stains readily with gentian violet, carbol fuchsin and methylene blue. Colonies on potato dextrose agar are circular with entire margins, smooth, convex, glistening and butyrous. Odour is absent and colour of the medium remains unchanged. Colour of the colonies is empire yellow. Internal markings (striations) not coming upto the margin. Moderate cloudiness in nutrient broth with no floccules and pellicle. Colour remains unchanged and odour is absent. Optimum temperature for growth is 20°-25°C., minimum about 5°C. and maximum about 35°C. Thermal death point is between 50° and 52°C. The organism liquefies gelatin and has a strong diastatic action on starch. Casein is digested. Nitrates are not reduced and indole and ammonia are not produced. Hydrogen sulphide produced. Asparagin utilised as a sole source of carbon and nitrogen. Litmus reduced in litmus milk and plain milk is cleared. Utilises dextrose, sucrose, raffinose, galactose, maltose, xylose, lactose, arabinose, levulose, mannitol and salicin. Growth good in Uschinsky's solution; no growth in Cohn's and Koser's uric acid medium.

The organism is pathogenic to *Desmodium gangeticum* DC.

A detailed paper is being submitted separately for publication.

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College of Agriculture, L. MONIZ.
Poona,
August 20, 1948.

PRELIMINARY OBSERVATIONS ON THE ROLE OF BLUE GREEN ALGÆ IN FISHERY PONDS AND IN THE CONTROL OF MOSQUITO BREEDING*

IT has now been realised that for tackling the urgent problem of increased fish supplies in the country, a rapid extension of fish culture through the utilisation of the neglected village ponds is one of the most hopeful ways. Public Health authorities interested in the control of mosquito breeding spray the same ponds with insecticides at frequent intervals and thereby make the ponds ineffective for fish culture. Thus there is great need at present for co-operative research with a view to integrating malaria control with fish culture.

In the course of a scheme of co-ordinating anti-malarial measures with pisciculture, Blue Green Algæ were found to play an important part.

It was observed that the fish culturists very often plant Blue Green Algæ [1,2] in nursery ponds in order to ensure a quick and healthy growth of carp fry. The utility of algæ as food for Indian Carps, has already been noted by Mookerjee[4] and Biswas[5]. The latter found that Blue Green Algæ "either epiphytic on the submerged water plants or floating freely as plankton serve as food to mosquito larvæ" while Senior White regards Blue Green Algæ as "inimical to *Anopheles* larvæ," (private communication). The observations recorded here will show that the growth of these algæ is inimical to the breeding of *Anopheles* larvæ.

Experiments have shown that Blue Green Algæ in a pond influences the pH of the water. The following table indicates the relative growth of Blue Green Algæ and the pH of water.

Correlation between the relative growth of Blue Green Algæ and the pH of water.

pH	Cases of algal frequency				
	Nil	Very thin	Thin	Thick	Total
8·0 to 8·4 ..	445	42	28	8	523
8·5 to 8·8 ..	11	3	10	24	48
Above 8·8 ..	0	0	0	12	12

The particular species found in these tanks is *Mycrocystys aeruginosa* (Kutzing)‡

pH value in relation to Mosquito Breeding

Sen[3] has pointed out that *Anopheles sundaicus* does not breed in waters above pH 8·5, average pH suitable for its breeding being 8·2. If along with the manuring of waters, attempts could be made, either by the introduction of Blue Green Algæ, or by Chemical treatment, to keep the pH of the pond water between 8·5 and 8·8, healthy growth of fish could be ensured, and at the same time breeding of a *A. sundaicus* checked.

It appears that use of soap solution, while beneficial for the growth of fish, is inimical to *Anopheles*. This is also the experience of fish culturists in Bengal.

The other malaria vectors of Bengal, *A. philippinensis, A. culicifacies,* etc., do not breed in organically polluted waters. So, in scientifically maintained fishery ponds, they should have no chance of breeding.

Mr. S. Roy Chowdhury, Statistician to the Directorate of Fisheries, Bengal, has very kindly analysed the data given in the above table statistically and confirms the relationship between the growth of algæ and the pH.

After the above note was prepared for publication, a very interesting article by Fogg [6] on "Nitrogen fixation by Blue Green Algæ" (pp. 172-75, 1947) has come out wherein the ability of certain species of Blue Green Algæ for fixing atmospheric Nitrogen is pointed out, thereby contributing to the maintenance of the fertility of tropical soils and the productivity of fresh water. In Blue Green Algæ, nitrogen and carbon assimilation proceed side by side in the same cell. As Fogg puts it, "In combining the nitrogen-fixing and photosynthetic modes of nutrition, blue green algæ resemble the legume-nodule-bacteria system".

It would appear that by providing the optimum conditions for the growth of Blue Green Algæ, the assimilable nitrogen contents of the water could be increased to the benefit of fish culture and malaria-control. There is hence good scope for a useful line of research on this aspect which would be of interest both to pisciculturists and malarialogists.

Directorate of Fisheries, Bengal, Calcutta,
August 9, 1947.

S. R. Das Gupta.

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* Published with the kind permission of the Director of Fisheries, Bengal.

‡ My thanks are due to Miss Eva Mitra for identifying the species.

STUDIES IN EXPERIMENTAL INSECT PARASITISM
SUPERPARASITISM

Bracon (Microbracon) gelechiæ Ashm., is an ectoparasite of the larva of the potato tuber moth, *Gnorimoschema operculella* Zell., which has recently been imported into India from Canada, for the control of the potato tuber moth, a serious pest of potatoes in storage in India. This parasite is bred in large numbers on the larvæ of *Corcyra cephalonica* St., in the Parasite Laboratories of the Indian Agricultural Research Institute, New Delhi.

In the course of experimental studies on the host selection by *Bracon gelechiæ*, it was observed that superparasitism had a direct bearing on (1) the size of individuals bred, (2) the number of adults bred per host and (3) the sex ratio of the resulting offsprings. It was found that superparasitism as a result of overcrowding of adult parasites in the oviposition cages is one of the causes of the low rate of breeding of *B. gelechiæ*.

Superparasitism and size and vigour of individuals

In cases where more than one parasite grub shared a single host it was found that as the number of parasite grubs per host increased, the size of the individual parasites decreased and in certain cases, degenerate forms (Figs. 1, 2 & 3) appeared as a result of overcrowding

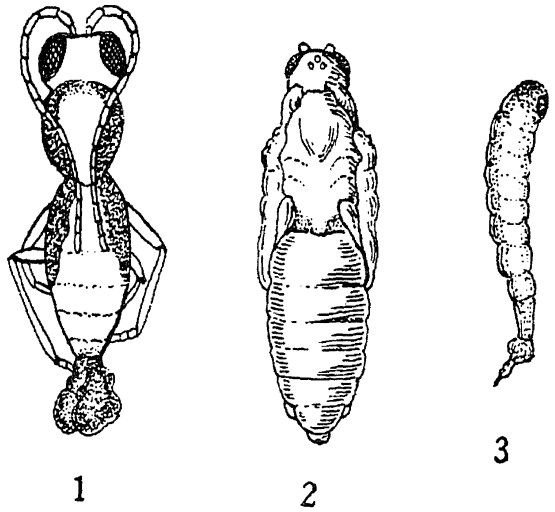

FIG. 1. Undeveloped 'Runt' × 15.
„ 2. Undeveloped naked pupa × 18.
„ 3. Degenarated prepupa × 15.

and consequent insufficiency of food. These degenerate forms on "runts" as described by Salt were very inactive, short lived, and in all cases, died before laying eggs. Structural deformities, such as modified antennal segments and reduced wings were very pronounced in many cases (Fig. 1). In certain cases, the parasitic grubs, instead of spinning cocoon, turned into naked pupa (Fig. 2) which did not develop into adults.

Superparasitism and sex ratio

It was also observed in the course of these studies that the number of parasite grubs sharing a single host for their development had a direct bearing on the sex ratio of the adults