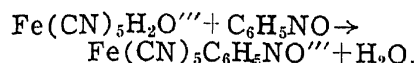
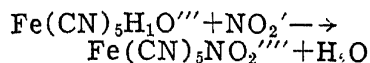
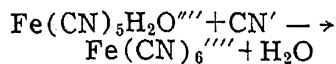


from ferricyanide is responsible for the after-effect. The quenching is produced because the highly reactive aquopentacyanoferrite ion is converted into much less reactive substances as follows:—



The above conclusions have been experimentally verified and fully substantiated by studying the decomposition by unisolated ferricyanide and a trace of the photo-catalyst, sodium aquopentacyanoferrate. We have been able to reproduce the photochemical after-effect in the dark by adding a trace of aquopentacyanoferrate ions to H_2O_2 - $\text{K}_3\text{Fe}(\text{CN})_6$ mixture. A quenching of this effect is also observed in the presence of CN' , NO_2' and $\text{C}_6\text{H}_5\text{NO}$.

The details of the investigation will be published elsewhere.

Chemical Laboratories,
St. John's College,
Agra,
August 9, 1943.

B. B. LAL.
C. P. SINGHAL.

1. Kistiakowsky, W., *Zeit. Physikal. Chem.*, 1900, **35**, 431.
2. Lal, B. B., *Jour. Ind. Chem. Soc.*, 1939, **16**, 7, 321.
3. Qureshi, M., *Jour. Physical. Chem.*, 1931, **35**, 656.
4. Lal, B. R., *Proc. Ind. Acad. Sci.*, 1941, **14**, 652.
5. Rao and Srikantan, *Jour. Ind. Chem. Soc.*, 1933, **10**, 29.

A NEW VARIETY OF ISOACHLYA ANISOSPORA (deBARY) COKER

In 1888, deBary¹ described a fungus as *Saprolegnia anisospora*. Recently its name has been changed to *Isoachlya anisospora* by Coker and Matthews² on sporangial characters. The present material was isolated from a pond, ten miles from Allahabad, using hempseeds as baits. All observations recorded below were made on cultures growing on hempseeds in distilled water.

Isoachlya anisospora (deBary) Coker, var. *indica*, nov. var.

Mycelium 8.18-16.36 μ thick. Spores of two kinds, smaller 9 μ in diameter while bigger ones upto 12 μ . Sporangia 14.5-24.5 μ thick and 99-163.63 μ long. Oogonia are spherical; terminal and also rarely intercalary; wall smooth; 37.14-92.85 μ mostly 60-66 μ in diameter; thickness of the wall 1.4 μ .

Antheridia present on all oogonia; long; androgynous and declinuous; applied by sides. Eggs 1-10 in number, never more than ten; 21.81-55.71 μ in diameter, mostly 24.54-35.45 μ ; thickness of the wall 3 μ ; not completely filling the oogonium; centric or subcentric.

I. anisospora var. *indica* differs from the main species in the structure of the egg which, in the present form, is either centric or subcentric (Figs. 1 and 2). In no case eccentric eggs were

formed as described by Coker and Matthews for the main species. Since the egg structure in this form does not agree with that of the

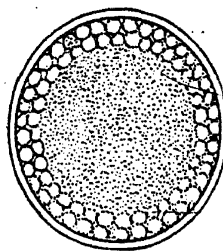


FIG. 1
A centric egg

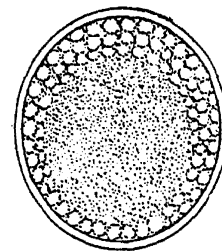


FIG. 2
A subcentric egg

American species, the authors consider it to be a new variety. Prof. W. C. Coker suggests us to call it a form of *I. anisospora*.

We thank Prof. W. C. Coker, University of North Carolina, U.S.A., for his kind advice, and also Prof. S. R. Bose, Carmichael Medical College, Calcutta, and Dr. John Dearness of Canada for communicating our description of the fungus to Prof. Coker.

Botanical Laboratory,
The University,
Allahabad,
February 5, 1944.

R. K. SAKSENA.
K. S. BHARGAVA.

1. deBary, A., *Bot. Zeit.*, 1888, **46**, 619.
2. Coker, W. C., and Matthews, V. D., *North American Flora*, 1937, **2**, 17-58.

PROGRESS OF HOMOZYGOSITY DUE TO BACKCROSSING

ACCORDING to Mendelian segregation in self-fertilized plants or in selfing cross-fertilized plants involving a single pair of genes, the fraction of the heterozygous individuals gets halved at every successive generation and at the end of a few generations a very large percentage of the population becomes homozygous. Where a large number of genes are concerned, the reduction in the percentage of heterozygous individuals is comparatively slow in the first few generations but later, say after ten generations, this percentage forms only a very small fraction of the population. The formula for determining the percentage of homozygous individuals in any generation following a cross is $(1 - \frac{1}{2^n})^m$ where n is the number of segregating generations which have elapsed since the cross was made and m , the number of independently inherited pairs of genes involved.

Let us now consider this principle in the case of practical stock breeding, say, improving milk yield in cows. In herds which lack the genes controlling high yield of milk, they may be introduced through mating them to bulls known to possess these genes. The rate of transfer of the genes will be the speediest when the sires selected for mating are homozygous for all the genes involved and the progenies are back-crossed in each succeeding generation to these same individuals or mated

to others having an identical genetic constitution. The rate at which the genes for milk yield are established in a homozygous condition in the population from such matings, can now be calculated and this rate will be a measure of improvement to be expected in the population for the characters under consideration.

With a single gene, say A, carried by the sires all members of the first generation will be heterozygous (Aa). On mating these heterozygotes again to AA individuals, half of the second generation progeny will be homozygous for A. The other half of the progeny will remain heterozygous and from the mating of this portion of the populations to AA individuals, a further half will be made homozygous in the third generation, assuming, of course, that all matings are equally fertile and yield the same proportion of survivals. Heterozygosity will thus be reduced by a half in each successive generation. The fraction of the population rendered homozygous for the gene A in each successive generation will thus be $\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}$ the total proportion of the population expected to become homozygous for the gene in the n th generation will, therefore, be the sum of $n-1$ such fractions, since homozygosity is nil in the first generation. The fractions from a geometric series with $\frac{1}{2}$ as the leading form and $\frac{1}{2}$ as the common ratio. The sum is $(1 - \frac{1}{2^{n-1}})$. If m genes are involved, that is, if the character under consideration is controlled by m genes, the fraction of the population expected to be homozygous for all m genes is obviously $(1 - \frac{1}{2^{n-1}})^m$.

By substituting in this formula different values of m , the number of genes assumed, and n , the number of generations, the rate at which the homozygosity increases in the population can be studied. Curves representing the homozygous fraction of the population in different generations are shown in Fig. 1 for the values of m equal to 1, 6 and 100.

If known fractions of the population already possess some of the m genes in a homozygous condition, the progress of homozygosity can still be worked out from the application of the formula separately to each fraction, assuming for the number of genes concerned the value m less the genes already existing in the fraction and taking a weighted sum of the results over the different fractions. For example, if six genes are involved and if $1/10$ of the population already possesses one of these genes, the homozygous fraction of the whole population in n generations will be

$$\frac{1}{10} \left\{ 1 - \frac{1}{2^{n-1}} \right\}^5 + \frac{9}{10} \left\{ 1 - \frac{1}{2^{n-1}} \right\}^6$$

The resulting curve practically overlaps the one for six genes (i.e., when the whole population originally lacks in all six genes) and is not shown in the figure.

All curves are asymptotic and complete homozygosity is thus theoretically impossible to achieve in the system considered here; but over 99 per cent. of the population reaches this stage in the eighth, eleventh and fifteenth

generations for 1, 6 and 100 genes respectively. In the initial stages also, with a single gene,

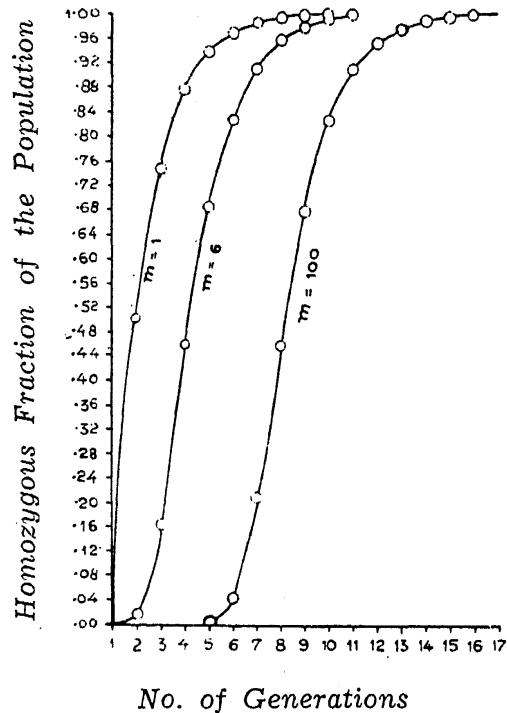


FIG. 1.—Progress of Homozygosity due to Backcrossing (m =No. of genes assumed to control the character)

half of the population becomes homozygous in the second generation, but no sensible homozygosity is found until the sixth generation in a population in which a hundred genes are segregating. The particular generation in which homozygosity is increased by the largest amount may be calculated with the help of the formula given above.

The increase in homozygosity in the n th generation over the preceding generation is

$$\left\{ 1 - \frac{1}{2^{n-1}} \right\}^m - \left\{ 1 - \frac{1}{2^{n-2}} \right\}^m$$

Differentiating this expression with respect to n and equating to zero, we have

$$n = \frac{\log \left\{ 2 \frac{2x-1}{x-1} \right\}}{\log 2} \text{ where } x = e^{\frac{\log 2}{m-1}}$$

for $m=1, 6$ and 100 the n th generation is second, fourth and eighth. It is thus clear that as the number of genes involved increases, the progress of homozygosity, i.e., the rate at which the genes are established in the population is retarded.

The results given above are derived purely from theoretical considerations and involve simple assumptions. In actual practice, however, the genetic situation is often more complicated as we cannot be sure of the genetic constitution of either the cows or the bulls. If the bulls used do not contain all the genes controlling the character or contain them only in a heterozygous condition the progress of improvement in the herd will be much slower than is shown here. That in cattle improvement the success of any breeding scheme

depends upon the selection of the bulls of the right genetic constitution needs no emphasis.

Cotton Genetics Research Scheme,
Indian Central Cotton Committee,
Institute of Plant Industry,
Indore, C.I.,
December 13, 1943.

G. R. AYACHIT.

ON THE OCCURRENCE OF *STREPTO-
CEPHALUS DICHOTOMUS* BAIRD
IN TRAVANCORE

ON 8-12-1943, I made a collection of small shrimp-like crustaceans from a fairly big pool of water about half a mile north of the Aquarium building and about two and a half furlongs inland from the Trivandrum beach. These were identified as the fairy-shrimp *Streptocephalus dichotomus* Baird.¹ About hundred specimens were brought to the laboratory and are being reared for further studies. The pool from which the collection was made is a temporary piece of water in a sandy depression which completely dries up during summer. It contained tufts of decaying grass and organic debris, together with some aquatic fauna such as tadpoles, water fleas and insect larvæ. The water at the time of collection had a pH of 7.7 and its oxygen contents was .46 per 100,000 parts.

These were observed to move about in shoals of 400-500 and normally prefer the deeper parts of the pool. They are transparent and hardly recognisable except for their pigmented eyes and deep orange-red anal lobes. The brood pouch in the female has an orange-red streak on its ventral surface and the second pair of modified antennæ in the male is slightly bluish in tint. The females were fully mature and their brood pouch contained ripe eggs in various stages of extrusion. The specimens measured from 19-22 mm., the males being slightly the longer. Two forms of this species, viz., the typical form as well as a variety *simplex* have been observed to occur together by Gurney,² but in the present collection only the typical form with four cirriform appendages at the distal end of the proximal antennal segment has been found to exist.

Only two species of *Streptocephalus*, viz., *S. dichotomus* Baird and *S. spinifer* Gurney, have been so far recorded from India and Ceylon and of these, the latter species has been found only from Ceylon.³ The former species has been recorded several times from various other parts of India, both from very high altitudes as well as the plains. The present collection extends further the range of distribution of this species in India.

Marine Biological Laboratory,
University of Travancore,
Trivandrum,
January 3, 1944.

K. GOPINATH.

1. Synonymous with *Branchipus (Streptocephalus) bengalensis* of Alcock, *Journ. A.S.R.*, 1896, 65, 538-39, pl. 10. 2. Gurney, *Ibid* (n.s.), 1907, 2, 276. 3. Kemp, S., *Rec. Ind., Mus.*, 1911, 6, 222.

OCCURRENCE OF A NEW VARIETY OF
THE SKATE, *UROGYMNUM ASPERRI-
MUS*, AROUND KRUSADAI ISLAND,
GULF OF MANAAR¹

THE Skate of the genus *Urogymnus* contributes to a fishery of moderate scale around Krusadai and neighbouring islands and the lagoons of Pamban, Gulf of Manaar, from October of one year to February of another year. They are captured by means of stake nets, which are set near the shore especially during New Moon and Full Moon days.

The Skate, on examination, shows the following differences from *Urogymnus asperrimus*,² the only species recorded by Day.

Distinguishing characters.—Snout does not project. Scales covering the body are mostly quadrangular in shape. The tubercles on the body are continued posteriorly to the first third of the tail. Where the pectoral fins meet in front of the snout, the outline is not roundish as in *Urogymnus asperrimus*, but is pointed out as in *Trygon sephen*.

Colour.—Body whitish above with black blotches on the head and on the tail, and milk-white below. A U-shaped black line between the eyes. The pectoral fins are greyish with round whitish spots of diameters varying from 3 to 10 mm.

The Director of Zoological Survey, to whom a specimen was sent, is of opinion that the differences noted above do not justify the creation of a new species for the Krusadai form. But, as all specimens recorded in this area show the above differences, the Krusadai form is given the status of a new variety, namely, *Urogymnus asperrimus* var. *krusadiensis*.

Fisheries Bureau,
Triplicane, Madras,
February 18, 1944.

P. I. CHACKO.

¹ Published with the permission of the Director of Industries and Commerce, Madras.

² Day, F., *The Fauna of British India, Fishes*, 1889, 1.

A PRELIMINARY NOTE ON THE
BREEDING OF A BENEFICIAL
ECTOPHAGOUS LARVAL PARASITE
(BRACONIDÆ) ON A LABORATORY
HOST

As a result of several attempts made very recently in this Laboratory a measure of success has been finally achieved in the matter of rearing out *Microbracon hebetor*, the larval, natural parasite of the Lab-lab Pod-borer, *Adisura atkinsoni*, on the larva of *Corcyra cephalonica* St., the common caterpillar pest of stored rice, jola and flour. The larvæ of *Corcyra cephalonica* St., the laboratory host, were offered to the parasites under environmental conditions, somewhat simulating those obtaining in a crop of Lab-lab.

One generation of twenty-two parasites, nine males and thirteen females, was reared out from a culture of six host larvæ, to which a batch of five natural parasites (two females and three males) recovered from field-parasitised pod-borers, was introduced; four of the