

The Velocity of Light.

At the end of the year 1928, when Michelson had finished his classical experiments, my attention was diverted to the experimental results obtained about the Velocity of Light, that seemed to show a kind of regular decrement.

I have given below the results of the determination of the velocity of light as given by De Bray (*Nature*, page 522, April 4, 1931):—

Year	Authority	Velocity
1902-4	Perrotin	299,901 ± 84 K.M./Sec.
1924-6	Michelson	299,802 ± 30 K.M./Sec.
1926	Michelson	299,796 ± 4 K.M./Sec. ¹
1928	Karolus & Mittelstaedt	299,778 ± 20 K.M./Sec. ²

De Bray pointed out in *Nature* (April 4, 1931) that the results obtained by different observers show a decrement in the velocity of light. The graph of the results obtained by Michelson also seems to show a similar variation.

Vrkljan (*Zeit. f. Phys.*, **63**, 688, 1930) has proved that according to the General Theory of Relativity of Einstein the decrement in the velocity of light is possible.

On the basis of the experimental results and some theoretical considerations based on the General Theory of Relativity and the Theories of the Expanding Universe, that has been up to this time neglected, *it seems most probable that the velocity of light in the Universe is decreasing*. It seems strange that up till now no attempt has been made to reconcile the results obtained by different investigators as regards the decrement in the velocity of light. The considerations of the Theory of Lemaitre and the General Theory of Einstein lead us to this inevitable conclusion that the Velocity of Light is decreasing from day to day, although very slightly, and this is the property introduced owing to the Expansion of the Universe. A detailed Mathematical account will be published in the *Indian Journal of Physics* and the *Physical Review*.

Lyceum,
Arrah, B. & O..
November 12, 1933.

Dr. M. ALARABY.

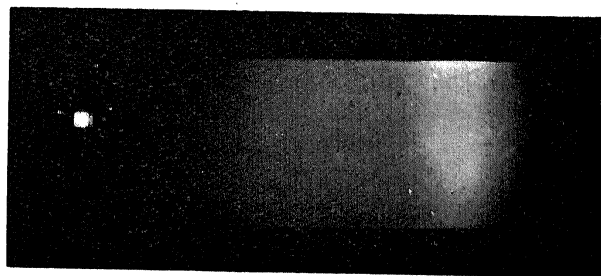
¹ Mt. Wilson Contr., 1928.

² *Phys. Zeit.*, **29**, 698, 1928.

Incoherent Nature of Phosphorescent Radiation.

IN a recent communication¹ we reported about the incoherent nature of the fluorescent radiation. It is perhaps of interest to enquire as to whether the phosphorescent radiation is incoherent like the fluorescent radiation or not.

So we recently repeated the experiment using a zinc sulphide screen in place of the cell containing the fluorescent solution and λ 3650 group of lines filtered out of the mercury arc with a "Corning glass filter". The screen was prepared in the following way—a glass plate was coated on one side with a thin film of water-glass. Over this film fine powder of zinc sulphide was spread till there was an uniform layer of the sulphide. We reproduce here the print (slightly enlarged) of the spectrogram we



obtained. This shows the *incoherent* nature of the radiation.

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Studies on the Chromosomes of Indian Orthoptera.

IV :—The Idiochromosomes of *Hierodula* species (?) (*Mantidæ*).

SEVERAL interesting forms representing the families Mantidæ and Phasmidæ are not uncommonly met with in the vicinity of the Ismail College, Jogeshwari, situated in the Salsette district about 20 miles north of the City of Bombay. So far as the writer is

¹ *Cur. Sci.*, **2**, 126, 1933.

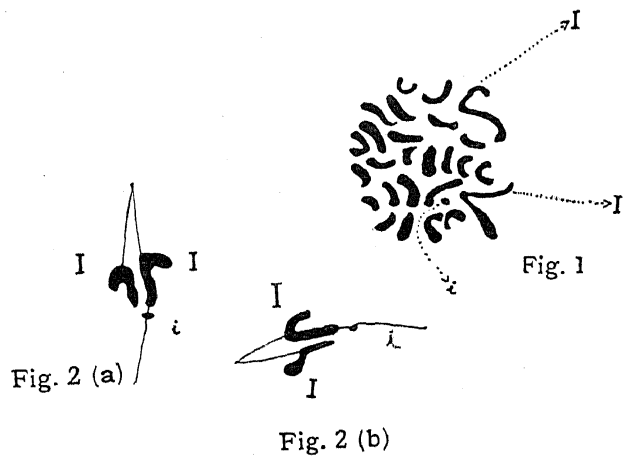
aware, barring three papers¹ published prior to 1912 and which are not easily accessible, no work has been done on the chromosomes of the above-named families of Orthoptera. In the present study on the meiosis as witnessed in the growing testis of Hierodula the writer has succeeded in making out not only the usual features such as the chromosome numbers, etc., but three peculiar idiochromosomes which can certainly be looked upon as sex-determinants.

Only the very minute testes of the earliest instar stages of Hierodula can reveal the diploid number of chromosomes. On the equatorial plate of a dividing spermatogonium at the metaphase 27 chromosomes are observed, 24 of which form 12 pairs of autosomes, which are all rod-shaped and vary in length. The remaining three, as subsequent observations show, are sex-determinants or idiochromosomes. Two of these three are very large, the largest of all chromosomes are almost always curved like V and lie always in the peripheral part of the equatorial plate. The remaining idiochromosome is the smallest of the three, almost dot-like and has no definite location on the spermatogonial spindle.

The most interesting feature in the meiosis is the form and position taken up by these three peculiar sex-determining chromosomes on the spindle at the metaphase of the primary spermatocytes. The two V's become large L-shaped chromosomes, and as seen in a tangential view of the spindle they lie side by side, though not connected with each other. They both are always directed towards one and the same pole, their longer arms lie parallel and the shorter arms at an acute angle with the axis of the spindle. The smallest of the three idiochromosomes appears at this stage almost as a small point and is directed towards the opposite pole and is united by a very thin thread to the longer arm of one of the L-idiochromosomes as shown in the diagram.

It is of interest to note that this smallest member of the group of idiochromosomes in

the Japanese form worked out by Oguma^{1(c)} is fairly large, almost half the size of the other two idiochromosomes.



Explanation of figures:—Drawings were made with a camera lucida, at a level about 4 cm. below the microscope stage. The optical combination was a Zeiss $\frac{1}{12}$ " oil immersion objective, N.A. 1.25; Zeiss compensating ocular, K $\times 15$; and Leitz aplanatic sub-stage oil-immersion condenser, N.A. 1.4.

Fig. 1. Polar view of spermatogonial metaphase chromosomes, 27 chromosomes; 'I', 'I' and small 'i' are three Idiochromosomes.

Figs. 2(a) and 2(b). Tangential views from two different cells of all the three Idiochromosomes at the metaphase on the primary spermatocyte spindle. Other chromosomes, autosomes, have not been drawn. The two large Idiochromosomes, 'I' and 'I' go towards one and the same pole, the small dot-like chromosome, the small 'i', is drawn towards the opposite pole.

In the ensuing anaphase of the reduction division the two L-shaped major sex-determinants always go towards one pole, while their associate, the smallest idiochromosome, is drawn towards the opposite pole. Thus are produced two classes of secondary spermatocytes. Their chromosome contents as seen on the equatorial plate of the metaphase are: (1) 12 autosomes + 2 Ls (two major parts of the idiochromosome complex); (2) 12 autosomes + a small dot-like chromosome (the smallest of the sex-determinants).

An attempt is being made to investigate the form, structure and behaviour of these peculiar idiochromosomes (sex-determinants) in a few forms of insects representing some groups of Mantidæ.

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¹ (a) Giardina, 1897; as quoted by E. B. Harvey in her paper "A review of the chromosome numbers in Metazon," Part I. *Journ. of Morphology*, 28, 1916.

(b) Sinety, R., 1901, *Recherches sur la biologie et l'anatomie des Phasms*, La Cellule, 19.

(c) Kan Oguma, 1912, "The Idiochromosomes of the Mantis," *Journ. of the College of Agriculture*, Hokkaido Imperial University, 10, Part I.