A typical set of observations for a piece of brass wire is given in Table I.

TABLE I

Load in gm.	Loading: Shift in cm.	Loading: Shift for 300gm. in cm.	Unloading: Shift in cm.	Unloading: Shift for 300gm. in cm.	Mean value of the shift for 300gm. in cm.	Grand mean of the shift for 300gm.
0	10·354		10·352			0·035 cm. ∴ θ = 1° 12·5′ from the graph
100	10·344		10·342			
200	10·332		10·330			
300	10·320	0·034	10·318	0·034	0·034	
400	10·308	0·036	10·306	0·036	0·036	
500	10·296	0·036	10·296	0·034	0·035	
600	10·284	0·036	10·284	0·034	0·035	

Radius of the drum D = 1 cm.
Material of the wire, = Brass.
Length „ „ „ l = 50·3 cm.
Radius „ „ „ r = 0·015 cm.
Hence the extension „ x = 0·0211 cm.

$$\text{Young's Modulus} = \frac{wg/\pi r^2}{x/l} =$$

$$= \frac{300 \cdot 980 \cdot 50{\cdot}3}{3{\cdot}142 \cdot 0{\cdot}015^2 \cdot 0{\cdot}0211} = 9{\cdot}92 \times 10^{11} \text{ dynes/cm.}^2$$

This method was used to determine the values of Young's Modulus for different metals generally used in the laboratories, *viz.*, Iron, Copper, Eureka, etc., and Table II gives a summary of the results obtained.

TABLE II

Material of the wire	Young's Modulus in dynes per cm.^{2}
Irom	20·18 × 10^{11}
Brass	9·92 × 10^{11}
Copper	10·91 × 10^{11}
Eureka	16·86 × 10^{11}

It seems possible that with little refinement, the method could be used to determine the Y.M. of thin glass fibres, silk threads, hair, etc.

I am indebted to Dr. D. V. Gogate for his useful suggestions and advice throughout the course of this work. My thanks are also due to Mr. L. V. Deshpande, B.SC., for his help in taking some of the observations.

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CONTINUOUS EMISSION BANDS IN THE SPECTRUM OF CCl_4

IN the course of an investigation on the high frequency discharge through stagnant and flowing CCl_4 vapour, we have observed a number of continuous bands as also reported by Asundi and Karim[1] in the emission spectrum of a discharge through flowing vapour of CCl_4. Table I summarises the data on the maxima of these bands and their features.

TABLE I

Numbers indicate wavelengths in Å of maxima

Asundi and Karim[1] (*a*)	Here (*b*)	Intensity (*c*): Flowing vapour	Intensity (*c*): Stagnant vapour	Cameron and Elliot[2] (*d*)
4600	4620	Strong	Strong	—
3348	3340	Weak	Absent	—
3070	3160	Strong	Strong	3063
—	2960	Weak	Absent	2957
—	2870	V. Weak	Absent	2881
2580	2560	Strong	Strong	2564
2430	2450	Weak	Weak	2432
2300 ?	—	—	—	—

(*a*) Read off from microphotometer curves.
(*b*) Read off from wavelength scale on spectrogram on a Hilger baby quartz spectrograph.
(*c*) Visually estimated only.
(*d*) From microphotograms of spectra, of high frequency discharge in chlorine gas.
? Doubtful.

It will be seen that all the bands except the two at 4620 Å and 3340 Å, are identical, within the limits of error, with those obtained in a discharge through chlorine. They are, therefore, in all probability due to Cl_2 or Cl_2^+. Such an interpretation of band at 2564 Å, is given by Cameron and Elliot.[2] Only the bands 4620 Å and 3340 Å are, therefore, to be regarded as characteristic of the CCl_4 discharge. They probably involve emitters containing both carbon and chlorine.

Asundi, *et al*'s[3] interpretation of the continuous bands observed in the spectra of flowing vapours of $SnCl_4$, etc., can be extended to the CCl_4 bands at 4620 and 3340 Å. Making use of the Born-Haber cycle and the various available thermochemical and spectral data required, the energy of dissociation of CCl_4 into unexcited atoms can be calculated. Using arguments exactly analogous to those for $SnCl_4$ it is possible to construct the simplified Franck-Condon diagram illustrating the intermediate steps of dissociation through which CCl_4 may be supposed to pass. Here, a knowledge of the internuclear distance C-Cl in CCl_4 and in CCl is helpful in drawing the curves rather accurately. It is found that it is possible to interpret the strong band at 4620 Å as the result of a transition in the CCl_4 molecule from the ground level of CCl which is also known by its discrete bands, to the repulsive curve of CCl_3; and the weak band at 3340 Å, similarly to the transition from the same initial level to the repulsive curve of CCl_3, in complete analogy to the continuous spectra in $SnCl_4$.

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JAGDISH PROSAD MISHRA.

1. Asundi and Karim, *Proc. Ind. Acad. Sci.*, 1937, **6**, 328. 2. Cameron and Elliot, *Proc. Roy. Soc.*, 1937, **158 A**, 681; 1939, **169A**, 463. 3 Asundi, Karim and Samuel, *Proc. Ind. Acad. Sci.*, 1940, **12**, 513.

SPERM DIMEGALY IN *ICHTHYOPHIS GLUTINOSUS* LINN.

SPERM DIMEGALY or polymegaly appears to be unknown in the Apoda. Examination of *Ichthyophis* material revealed a number of dimegalous sperms of this animal. Scattered amongst the normal sperms in the testis, there occasionally is a sperm with a conspicuously large nucleus and which, on closer examination is seen to be double in respect of the "middle piece" and axial filament but single in respect of the nucleus and the acrosome. Such a sperm is shown in Fig. 1.

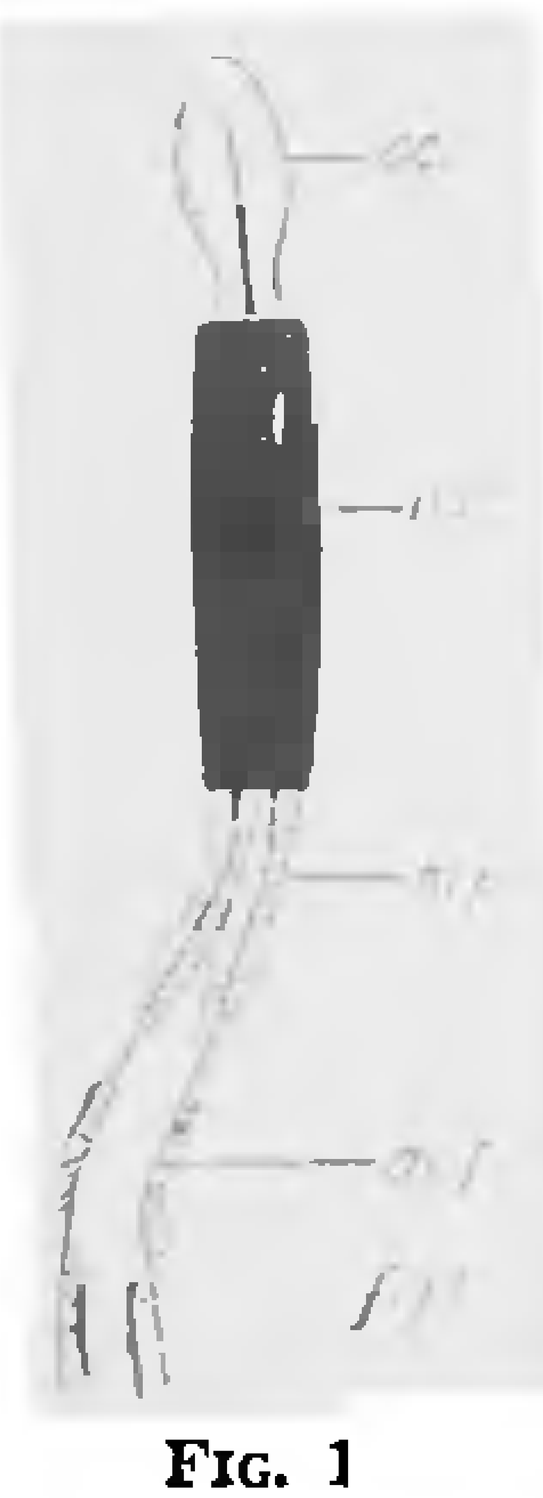

FIG. 1

Dimegalous sperm of *Ichthyophis glutinosus* × 2250

ac.—acrosome. *ax. f.*—axial filament. *m. p.*—middle piece. *nuc.*—nucleus.

It is generally known that in dimegaly, whether pathological or physiological, one or both divisions are suppressed in meiosis with the result that large-sized cells (primary or secondary spermatocytes) proceed to give rise to sperms by spermateleosis. Such di- and polymegaly has been known among insects, particularly the Hemiptera, where large giant spermatids derived from spermatocytes, either without any division or by fusion after division, proceed to give rise to giant spermatozoa.

The sperm figured above is a typical dimegalous one of *Ichthyophis*. The axial filament as well as the 'middle piece' is double while the nucleus and acrosome are single. But the noteworthy fact about both the nucleus and the acrosome is that they are double the normal size of these structures. The nuclear volume of a normal sperm of *Ichthyophis glutinosus* has been determined by me* to be about 25·1 cubic microns, while that of the dimegalous sperm described above is 49·9 cubic microns, nearly double that of the normal sperm. In the matter of the acrosome also, its size is very much larger than that of the normal sperm though I have had no means of calculating the actual volume of this structure.

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* Seshachar, B. R., *Proc. Ind. Acad. Sci.*, 1943, **27**, Sec. B. No. 5, 138.

DEGRADATION OF CHLOROPHYLL DURING TEA FERMENTATION

IN the manufacture of black tea the fermenting leaf changes its green colour to a coppery red tone. A rough estimation of this change of chlorophyll has been carried out by Carpenter,[1] Bokuchava,[2] as also in this laboratory, which show that the leaf loses about three-fourths of its chlorophyll during a four-hour fermentation.

Steaming arrests these changes completely, which indicates that an enzyme is concerned in the breakdown of the chlorophyll.

The degradation of chlorophyll may involve (1) formation of pheophytin by removal of Mg by plant acids, (2) hydrolysis by chlorophyllase whereby phytol is removed and (3) oxidation as a result of which the phase test is no longer obtained. Of these, that which tea leaf chlorophyll undergoes during fermentation appears to be limited to the last-mentioned. There was no evidence for the presence of chlorophyllase in tea. No pheophytin was detectable in the acetone extract of crushed leaf either before or after fermentation. During *in vitro* experiments the disappearance of green colour coincided with lack of response to the phase test, indicating an oxidation reaction. This was further confirmed by the fact that hot saponification of the 'fermented' chlorophyll product followed by treatment with acid did not yield phytochlorin *e* and phytorhodin *g*.

The mechanism of oxidation of chlorophyll appears to be as follows:

$$\text{Tea tannin} + O_2 \xrightarrow{\text{Polyphenol oxidase}} \text{O-Quinones}$$

$$\text{O-Quinones} + \text{Chlorophyll} \longrightarrow \text{Tea tannin} + \text{chlorophyll oxidation products}$$