

Pareuxostoma Regan is a synonym of *Glyptosternum* McClelland. These conclusions were based on an examination of abundant material collected by my colleague Dr. B. N. Chopra in the Chitral Valley, from which waters drain into the Kabul River.

Through the courtesy of the Bombay Natural History Society I have received a small collection of fish, comprising 4 specimens, made during August last in the Paghman River, a tributary of the Kabul River, by the Legation Surgeon to the British Legation at Kabul. In this lot there is a well-preserved specimen of *G. reticulatum*, the study of which leaves no doubt whatsoever of the identity of McClelland's much-discussed species with *P. stoliczkae*, and in consequence changes will have to be made in the nomenclature of these, as well as in the closely allied Sisorid fishes.

SUNDER LAL HORA.

Zoological Survey of India,
Indian Museum, Calcutta,
October 22, 1932.

Gregarious Collembola.

TURK¹ describes the swarming of Collembola in England and Davies² indicates the cannibalistic habit observed by him as a factor of swarming. There is no record of these interesting phenomena from India. Since swarming is confined to gregarious species only (Turk)¹, I give below a few examples of gregarious Collembola of Calcutta.

Protanura Carpenteri M.³ which has been reported by me to be gregarious in habit is found occasionally congregated in large numbers among kitchen garbage in Calcutta. *Onychiurus fimetarius* L., recorded by Handschin⁴ from South India, has been observed by me to live in colonies in the crevices of a wall close to a water reservoir. Both immature and mature individuals banded themselves at dusk into groups over the floor adjoining the wall. Swarming took place at the end of last July and specimens formed such a dense mass as to cover nearly the whole of the lower portion of a damp wall of a kitchen. The increase in number was such that specimens for days together were found carried away with the drainage water. The third example of gregarious

habit is furnished by a species of *Lepidocyrtus* specimens of which were seen crowded together near the surface of water and a number of their moulted skins occurred matted together.

I have not seen in any of these cases the cannibalistic habit reported for the first time by Davies.² Humidity is undoubtedly necessary for the existence of these atracheate species; but I believe, they would not, if the humid condition were favourable and uniform all over the locality, collect themselves into groups, unless there were other factors at work. Although the actual food of the gregarious collembola could not be determined by direct observation,³ an abundant supply of food as suggested by Turk¹ seems to be the important factor for keeping the members together. The cannibalistic habit referred to, may be explained in a different way as supplementing supply of food at times of scarcity rather than as a factor of swarming.

In discussing factors of swarming of these apterous insects, it should, however, be mentioned whether the term swarming is used in the same sense as in truly social insects as otherwise a confusion may arise between a temporary congregation and swarming that implies an active productive phase and migration for founding new colonies.

DURGADAS MUKERJI.

Zoological Laboratory,
University College of Science,
Calcutta.

Some Studies in the Infra-Red.

IN continuation with the work on the absorption spectra a self-recording spectrometer is constructed in order to avoid the uncertainties of visual observations which are found to be long and laborious. Since the time of Langley many designs have been suggested, especially by French workers in this field. In the construction of this instrument special precautions have been taken to protect it from stray radiations and to keep the rock-salt prism unaffected by moisture. A definite advance has been made in the technique of the instrument with the result that the fine line structure of the infra-red absorption bands has been observed with considerable precision. This has been secured by modifying the older methods, increasing the resolving power of the dispersing apparatus and enhancing the

¹ *Nature*, 129, 830, 1932.

² *Nature*, 130, 94, 1932.

³ *Rec. Ind. Mus.*, 34, 49, 1932.

⁴ *Rev. Suisse. Zool.*, 36, 236, 1929.

sensitivity and the control of the recording instrument.

The spectrometer consisted of two 30° prisms A and B of rocksalt. The one was fixed and the other could be rotated round a vertical axis and was mounted on the table LMNO. These two prisms were arranged in such a way that they acted as one at the position of the minimum deviation. To the table were also attached a concave mirror M_2 and a Hilger Thermo-electric Pile P. The radiations from a constant source (a Nernst Lamp) were made parallel by another concave mirror M_1 and after traversing the two prisms were concentrated by the mirror M_3 on the thermopile.

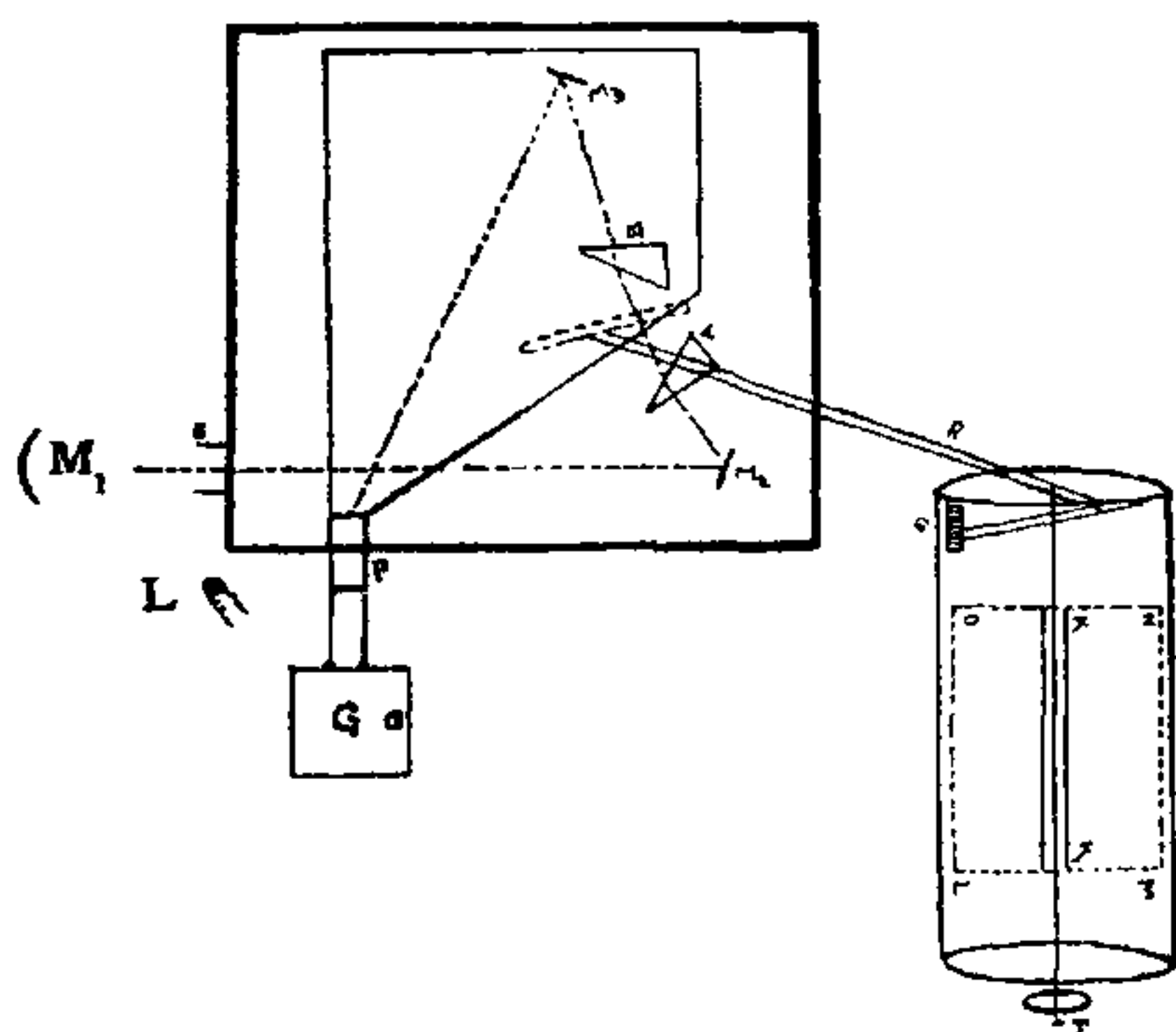


Fig. 1.

Self-Recording Spectrometer.

The recording instrument used was a Paschen Galvanometer with all the devices for protecting it from the external vibrations. Later on it was found that a Moll type galvanometer could conveniently be replaced with all the possible advantages. It was extraordinarily little disturbed by vibrations or external magnetic fields and its sensitivity was also found to be much higher than that of Broca type and about one-sixth of that of Paschen.

As in many self-recording instruments, the spot of light from the galvanometer traced a curve corresponding to the wave-length on an emulsion sensitive paper wrapped round a drum kept rotating by means of a small motor at a constant speed. The drum was also connected to the axle of the prism table by means of a lever arrangement RG. A 60° prism was found unsuitable for this work as

a rotation of about 10° could turn all the rays out of the field.

The one conspicuous feature of the instrument was that it could obtain automatically and without the possibility of any personal error a photographic record of the absorption spectra in an appreciably short time.

The instrument before use was calibrated by means of some definite and known radiations. For this purpose the emission bands of CO_2 given by the Bunsen flame at 4.32μ and 4.43μ and those of other substances were used.

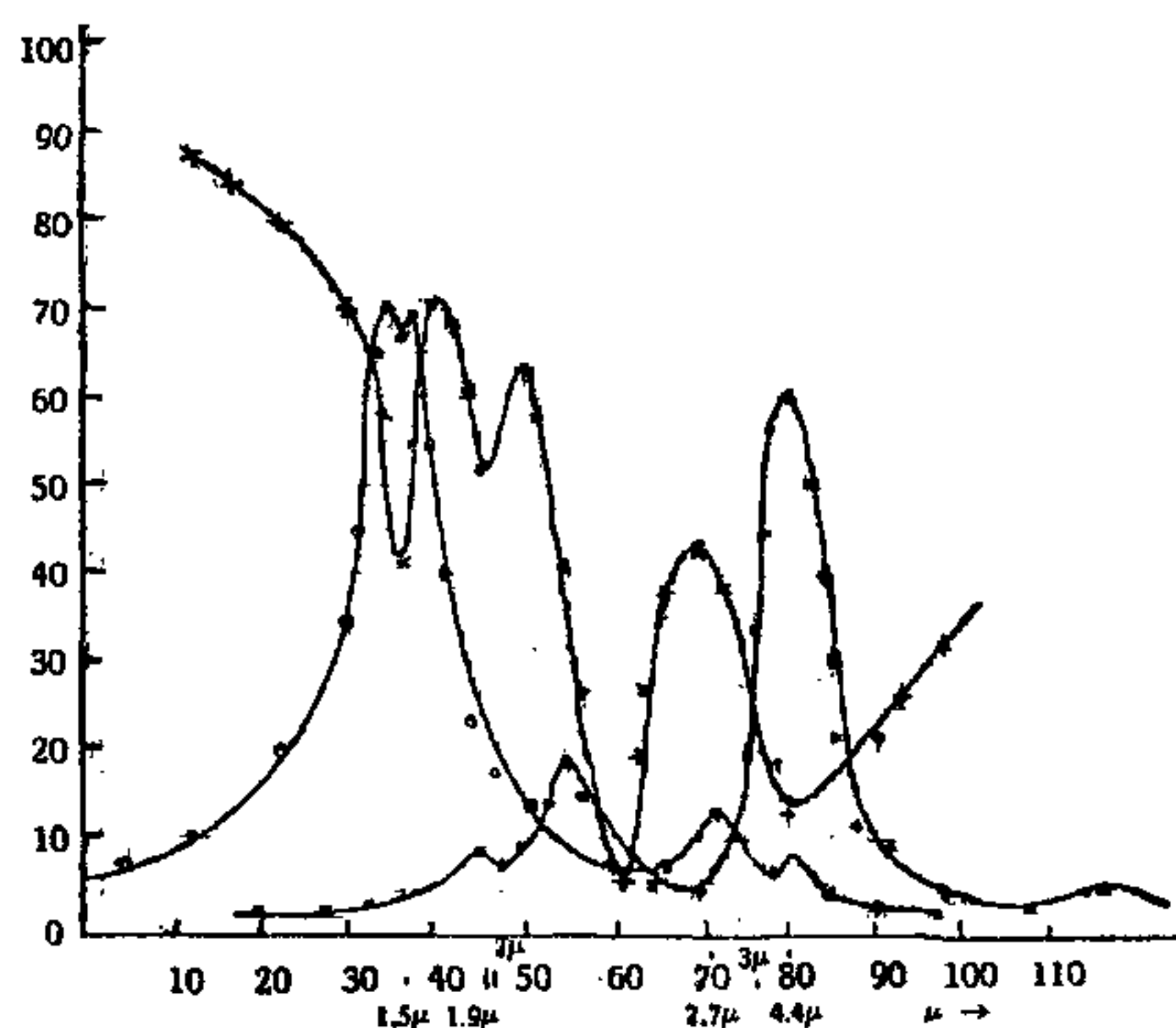


Fig. 2.

Calibration Curve.

× ×—Absorption Curve for Gypse.

• • Emission Curve for Gas (CO_2).

Two of the transmission curves of benzene and nitro-benzene are given in Figs. 3 and 4. Continuous and the dotted lines indi-

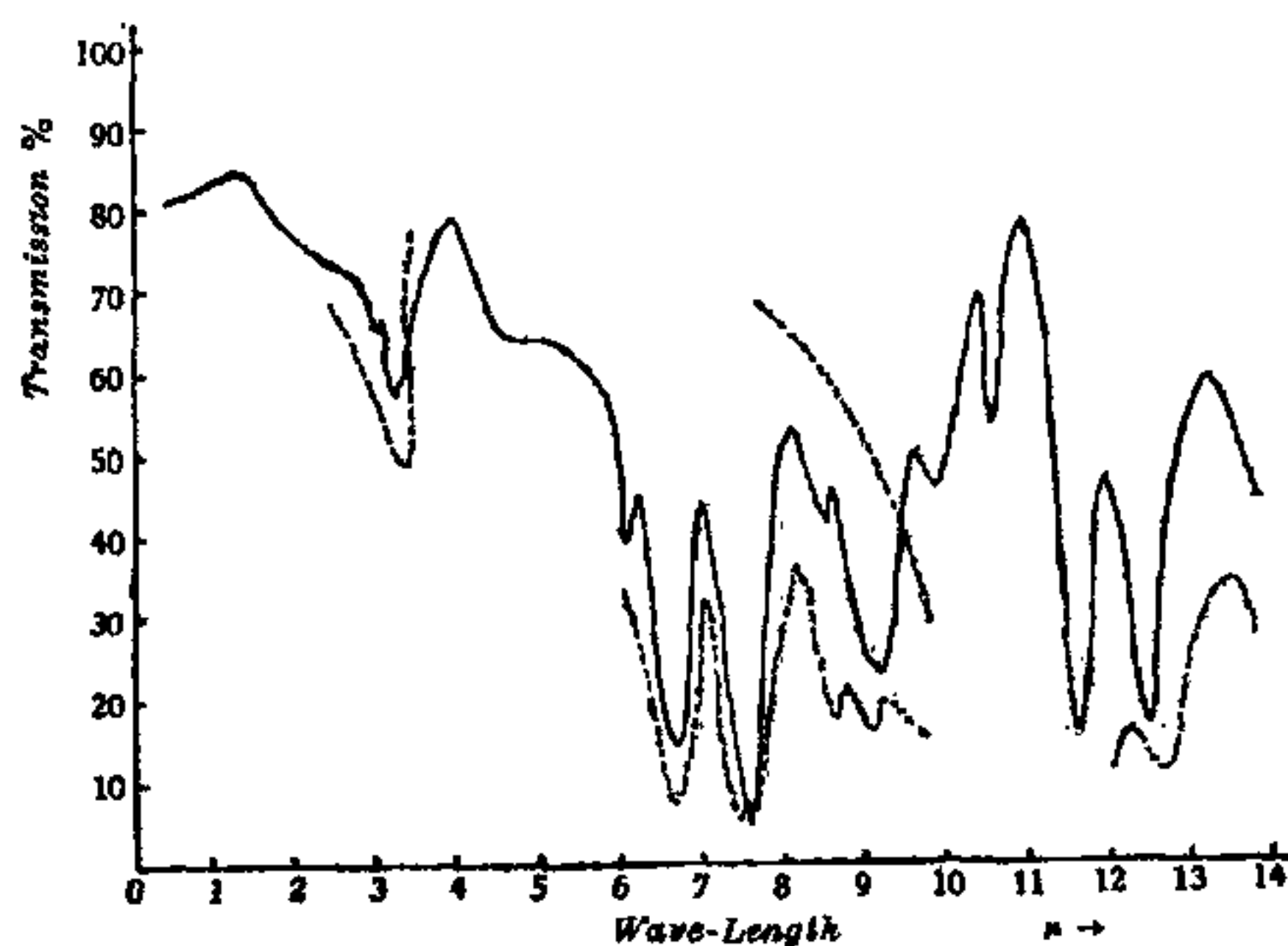


Fig. 3.

Benzene— C_6H_6 .

$t=0.01, 0.02$ mm.

cate the different thicknesses of the cells used, which were 0.01 mm. and 0.02 mm. in the case of benzene and 0.014 and 0.02 mm. for

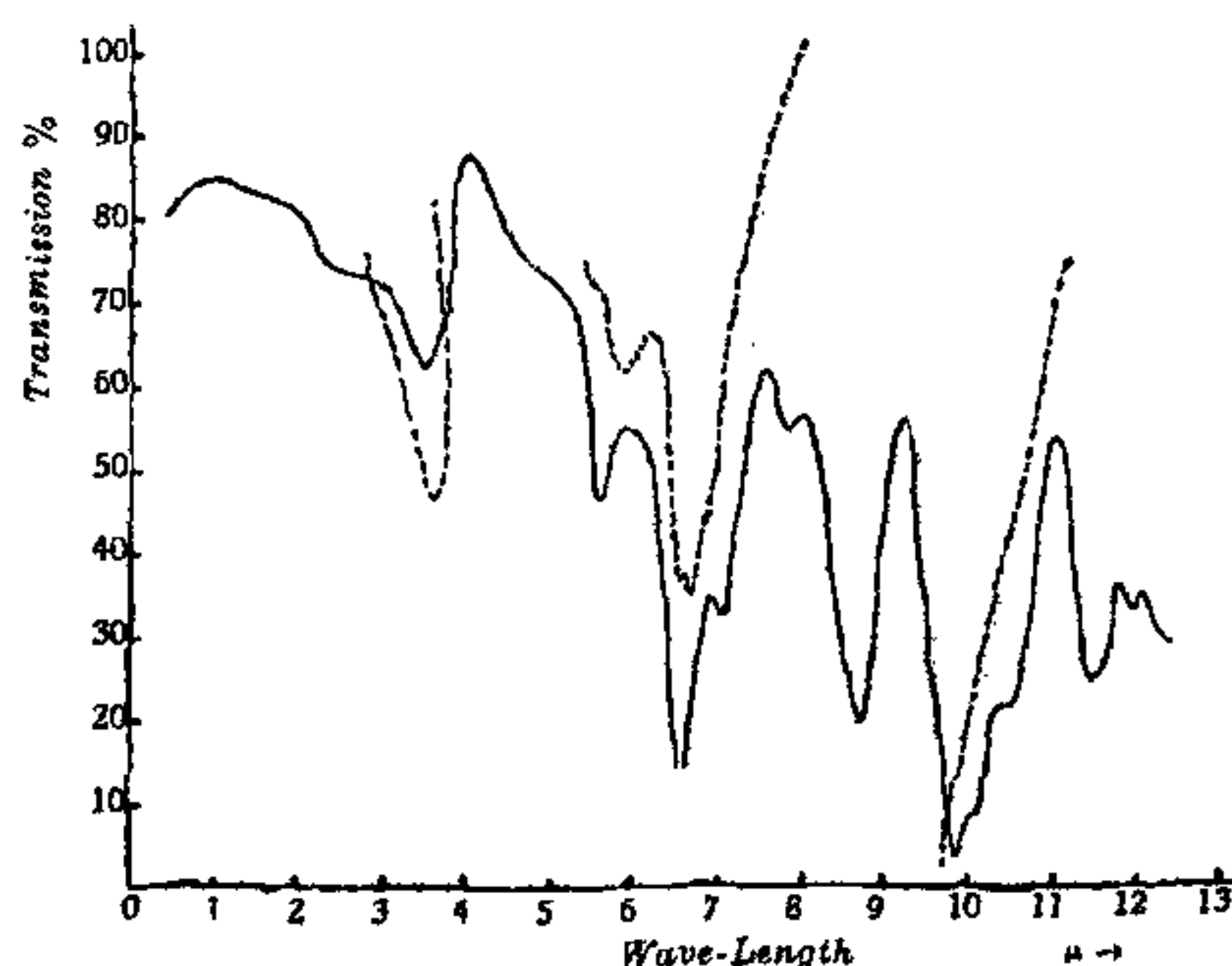


Fig. 4.

Nitro-Benzene— $C_6H_5NO_2$.
 $t=0; .015$ mm.

nitro-benzene. (They were calculated afterwards by direct measurements.)

The benzene spectrum showed a great transparency throughout the whole spectrum upto 14.2μ when it became suddenly opaque. The bands at 3.25μ and 6.8μ are to be noted very carefully as they occur in all the complex derivatives of benzene, and lead to the conclusion that the vibration of the benzene molecules is not destroyed.

The spectrum of nitro-benzene on the whole showed numerous and well-defined absorption bands. From the comparison of the curves for benzene and nitro-benzene it appears that the introduction of NO_2 group does not very much affect the benzene spectrum. Besides, there does not appear to be any other characteristic vibration due to this group, but there is a likelihood of 1.15μ band to be associated with it as this band is often found in all the spectra of the compounds having NO_2 group.

The other characteristic bands found from the curve were at 3.3μ , 6.25μ , 8.6μ , 9.85μ , and 11.4μ .

A. P. MATHUR.

Bombay,
 October 24, 1932.

Thermo-Hardening of Shellac.

SHELLAC and the Australian Acaroids, alone amongst the natural resins possess the property of thermo-hardening. This property

is similar to the 'going-over' under heat exhibited by the phenol-formaldehyde class of synthetic resins, the commercial possibilities of which have been so energetically and successfully developed. The possibility of developing this property of shellac on similar lines has been investigated in this laboratory.

As a preliminary, a study was made of the factors influencing the time of heating required to 'cure' shellac. The possibility of considerably retarding or accelerating the process by additions of small quantities of certain materials has been established. These materials can apparently be classified into certain groups; e.g., retarding substances include alkalis and solvents, while accelerators include acids, ester-forming catalysts, ammonia and ammonium liberating agents.

The effect of pressure was shown to be of great importance as it produces a very big retarding influence. This is a serious obstacle to the use of shellac as a moulding binder as the time of curing *in the press* is extremely long. It was found necessary to cool the mould before removal from the press and subsequently complete the cure at a low temperature, i.e., about $80-90^\circ C$. Moulding prepared by this method, with addition of certain accelerators, have been shown to possess improved heat-resistant properties.

It is hoped that a paper will shortly be published describing the above work.

R. W. ALDIS.

S. RANGANATHAN.

Indian Lac Research Institute.

Namkum, Ranchi,

October 20, 1932.

Coronium Spectrum.

THE identification of the Coronium Spectrum with the spectrum of oxygen by T. L. de Bruin has evoked considerable interest recently in astrophysical circles, and in spite of the strong combinations which he has observed in the new terms of the oxygen spectrum, explaining some of the most important line of Corona, it must be admitted that the criticism of some of the very careful workers in the field of spectroscopy cannot be easily met. Theoretically there is no place for the new terms discovered by de Bruin. And with our past experience with the modern theory of spectra it is hard to believe that our present-day methods for calculating the spectroscopic terms are not materially correct. This, therefore, leaves