division of the centents of the sporangium into zoospores takes place (Figs. 2 and 3). In one instance the formation of the exit tube which pierces through the wall of the urediospore was observed (Fig. 2). The hypnospore can be differentiated from the sporangium by its

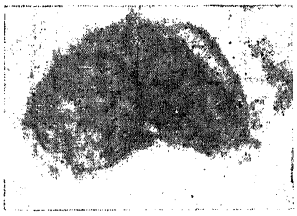

FIG. 3

Photomicrograph of urediospore showing the sporangia of *Oplidium uredinis*.

thick wall, the exospore being smooth and hyaline.

M. J. THIRUMALACHAR.

Department of Botany,
Central College,
Bangalore,
August 2, 1942.

[1] Fischer, A., Phycomycetes in Rabenhorst's *Kryptogamen Flora*, 1892, 2 Aufl., Leipzig, Bd. 1.

[2] Arthur, J. C., *The Plant Rusts*, (Uredinales), 1929.

A NOTE ON THE RAINFALL AT MADRAS AND BANGALORE

THOUGH Madras and Bangalore are on very nearly the same latitude, the difference between their heights and the distances from the sea, affect the distribution of rainfall in a characteristic way. September is the wettest month in Bangalore while in Madras, November is the corresponding month. January is the driest month in Bangalore and February in Madras. The number of rainy days is very nearly the same, *viz.*, 57·7 for Bangalore and 57·2 for Madras; but the average annual rainfall at Bangalore is 36·05" only while at Madras it is 49·57"; thus on an average more rain falls at Madras than at Bangalore on a rainy day. Madras gets in the North-East Monsoon 63 per cent. of the annual total while Bangalore gets only 25 per cent., and Bangalore gets 56 per cent. of the annual total in the South-West Monsoon while Madras gets only 31 per cent.

When hourly distribution of rainfall is considered the following interesting details are noticed. If the day is divided into periods of six hours, it is found that at Bangalore the period 6 p.m. to midnight is the wettest part of the day in all the seasons and 6 a.m. to noon, the driest. Madras resembles Bangalore only during the South-West Monsoon; in summer 6 a.m. to noon is the most rainy period and 6 p.m. to midnight the driest period while during the North-East Monsoon season midnight to 6 a.m. is the wettest period and noon to 6 p.m. the driest period. The difference is probably due to conditions of instability developing over land masses towards the evening and early hours of the night and over the sea towards late hours of the night and early hours of the morning.

It is also found that rainfall per rain-hour at Madras is generally greater than at Bangalore in all the seasons.

C. SESHACHAR.

Central Observatory,
Bangalore,
August 20, 1942.

THE VERTICAL AND HORIZONTAL SHRINKAGE OF BLACK COTTON SOIL AT MANDALAY, BURMA

WHILST investigating the cause of the excessive and continual warping and cracking of buildings constructed in Mandalay, Burma, an endeavour has been made to trace the Clarke* buckling effect of the substrata during expansion and contraction of the clay under variations in moisture content.

Mandalay soil resembles a black cotton soil, and is slightly calcarious and alkaline. It possesses a massive† columnar structure and it was, therefore, thought that vertical and horizontal contraction of the natural elements during drying might be unequal and hence ultimately

TABLE I

Showing percentage contraction and loss of moisture of samples collected from building compounds on drying from their natural moisture content

SITE	Original moisture content% dry wt.	Moisture content after "air drying" at app. 50% R.H.	Lineal shrinkage % (Average of 12 readings)		Ratio of horizontal to vertical shrinkage
			Horizontal	Vertical	
1. Provincial Police Training School ..	8·07	5·81	2·10	2·09	1·01
2. District and Sessions Judge's Quarters ..	11·81	5·79	2·52	1·45	1·75
3. Office of the S.D.O., P.W.D. ..	11·20	5·59	3·13	2·62	1·16
4. Office of the Deputy Director of Agriculture	9·96	3·95	1·64	1·54	1·07

TABLE II

Showing percentage contraction and loss of noisture of samples collected from building compounds on drying after artificial in situ *watering*

1. Provincial Police Training School ..	14·28	6·11	2·66	2·29	1·16
2. District and Session Judge's Quarters ..	17·34	6·30	4·87	4·80	1·02
3. Office of the S.D.O., P.W.D. ..	21·57	5·28	2·09	1·59	1·31
4. Office of the Deputy Director of Agriculture	16·75	4·63	2·37	2·16	1·10

lead to the buckling of the soil and help to explain the dynamic sinusoidal curves of building deflection.

To test this, approximately 6″ soil cubes were extracted from four different places, from one to two miles apart, and from a depth of 1½′ to 2′. From each site cubes were taken at two different moisture contents—at the dry weather natural moisture content and at a higher moisture content after artificially watering the soil *in situ*.

As the cubes dried the vertical and horizontal contractions were measured from the variation in the distance between pins placed, in each of the four vertical faces of the cube, at approximately 10 cm. apart. Each measurement reported below is a mean of 12 lineal measurements. In future work some more accurate method of measurement is necessary.

Notes.—At District and Session Judge's quarters:—Approximate clay content 60·0 per cent; colloidal clay 49·0 per cent.; S/R 2·68. Approximate replaceable bases:—
CaO, — 24·75 m.e./100 gm. air dry soil; MgO, 17·50 m.e./100 gm. air dry soil; Na_2O, 2·25 m.e./100 gm. air dry soil; K_2O, 0·28/100 gm. air dry soil.

Although the data given are not very conclusive and contain some anomalies, it nevertheless appears that there is a tendency for the horizontal contraction to exceed the vertical contraction.

As the replaceable bases vary considerably in the black cotton soil, future work on similar

soils, should include for testing predominantly monionic Na and Mg samples.

A. T. SEN.
F. L. D. WOOLTORTON.

Dacca University,
Ramna, Dacca,
September 20, 1940.

* G. R. Clarke, *The Study of Soil in the Field*, 1938, p. 93, Clarendon Press.

† Massive columnar structure of approximately hexagonal figures, about 4′ in diameter, is formed in dry weather but strictly speaking there is no obvious macro-structure.

VELOCITY OF LONGITUDINAL TRANSPORT AND TRANSEVERSE TRANSLOCATION OF ROOT-FORMING HORMONE IN IMPATIENS

IN continuation of our work[1] on induced root formation in Impatiens, we have found the rate of translocation of the internal hormone to be 1·8 mm./hr. at the apical region, 2·4 mm./hr. at the basal region and 2 mm./hr. throughout the stem. The above rates were calculated as follows:—

Lanolin paste of 1 per cent. β indol acetic acid was applied to similar plants at the apical, central and basal regions of the stem and the time of root formation and the distance from the leafy top to the region of application of the paste gave the required results.

Fig. 1 *a* shows the root induction by 1 per cent. β-indol acetic acid lanolin paste on the defoliated half of the split stem, thereby demonstrating that the internal hormone has been transversely transported across the stem below the split from the non-defoliated half of the split stem. Fig. 1 *b* shows a split plant which has been treated simultaneously on both halves with root formation on the foliated half of the stem only, thereby indicating that the internal hormone has been arrested on the foliated half and consequently inhibiting root formation on the defoliated half. Application of the paste to a completely defoliated stem but supplied with solutions of sugars and vitamin B_1, does not induce root formation which again indicates that the defoliation has rendered the stem devoid of the natural internal hormone.

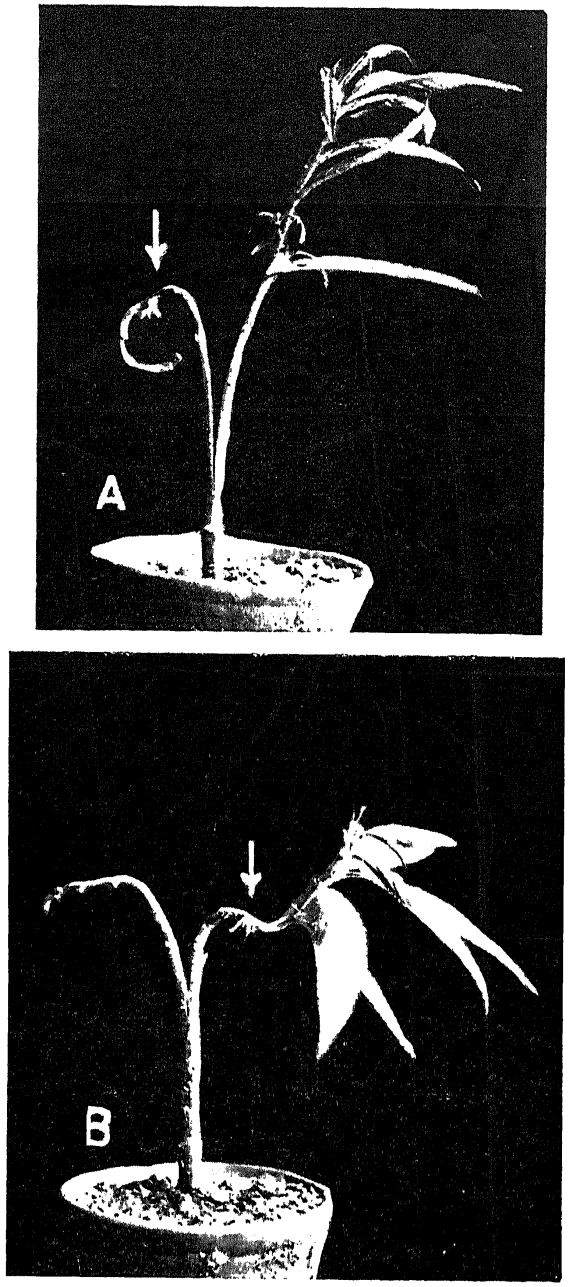

FIG. 1

Rooting responses in split stems of Impatiens

A, defoliated side treated with 1% indole acetic acid (note root formation on the defoliated side indicated by arrow). *B*, defoliated and leafy sides both treated with 1% indole acetic acid (note root formation only on the leafy side indicated by arrow).

The detailed paper will be published in the *Transactions of the Bose Research Institute.*

B. K. DUTT.
A. GUHA THAKURTA.

Bose Research Institute,
Calcutta,
July 29, 1942.

[1] Dutt, B. K., and Guha Thakurta, A, *Trans. Bose Res. Inst.*, 1939–41, **14**, 73–89.