

9. Apte, V. P. and Dhaneshwar, R. G., Sent to the *Talanta*.
10. Vartak, D. G. and Shetiya, R. S., *Indian. J. Chem.*, 1965, 3, 533.
11. Kozlovskii, M. T. and Bukhman, S. P., *Chem. Abstr.*, 1956, 50, 16465 d.
12. Vogel, A. I., *A Text-Book of Quantitative Inorganic Analysis*, Published by Longmans, Green & Co. Ltd., 3rd Edn., 1951, p. 87.
13. Bishop, E. and Dhaneshwar, R. G., *Analyst*, 1963, 88, 424 et. seq.
14. Apte, V. P. and Dhaneshwar, R. G., *Talanta*, 1966, 13, 1595.
15. Athavale, V. T., Dhaneshwar, R. G. and Sarang, D. A., *Ibid.*, 1967, 14, 1333.

## ATOMIC ABSORPTION SPECTROPHOTOMETRY AS A TECHNIQUE IN THE DETERMINATION OF VAPOUR PRESSURE OF METALLIC ELEMENTS

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VAPOUR pressures of a number of metallic elements at various temperatures, measured by different techniques, have been reported by many workers.<sup>1</sup> The vapour pressures of elements like Ag, Au and Mn are extremely low even at flame temperatures, e.g., Ag has a vapour pressure of  $9.8 \times 10^{-10}$  mm. of Hg at 800° K, Au  $3.3 \times 10^{-10}$  mm. of Hg at 1000° K, and Mn  $3.6 \times 10^{-9}$  mm. at 800° K.

In this note, we indicate the applicability of the new technique of atomic absorption spectrophotometry (AAS) in the determinations of vapour pressures of elements like Hg, Ag, Au and Mn at different temperatures.

In the low vapour pressure range under consideration, the partial pressures obey the gas law, i.e.,

$$p = n k T \quad (1)$$

Absorbance  $A_T$ , by the metallic vapour (at temp. T), of the monochromated beam from an HC lamp is proportional to the concentration of atoms 'n' in the vapour phase. Therefore, we write from eqn.(1):

$$p = K_p \cdot A_T T \quad (2)$$

where  $K_p$  is a constant.

The absorbance values at a number of temperatures were obtained for Hg using a quartz window absorption cell having suitable heating and temperature measuring arrangements placed in the path of the monochromated beam (2537 Å) from a Hg vapour lamp. Vapour pressure (p) for Hg at these temperatures was read from standard Tables.<sup>1</sup> Figure 1 gives the results at various temperatures where the linearity of p vs.  $A_T T$  envisaged in eqn. (2) has been obtained.

Using the Clausius-Clapeyron's equation on variation of vapour pressure with temperature one derives the first approximate relation,

$$\log p = a + \beta/T \quad (3)$$

where  $a$  and  $\beta$  are constants characterising the element in a given phase, i.e.,  $\log p$  and  $1/T$  bear a linear relationship. Such relationships for the elements Hg, Ag, Au and Mn have been established by earlier workers at elevated temperatures (900-1000° K.). Combining equations (2) and (3) one obtains:

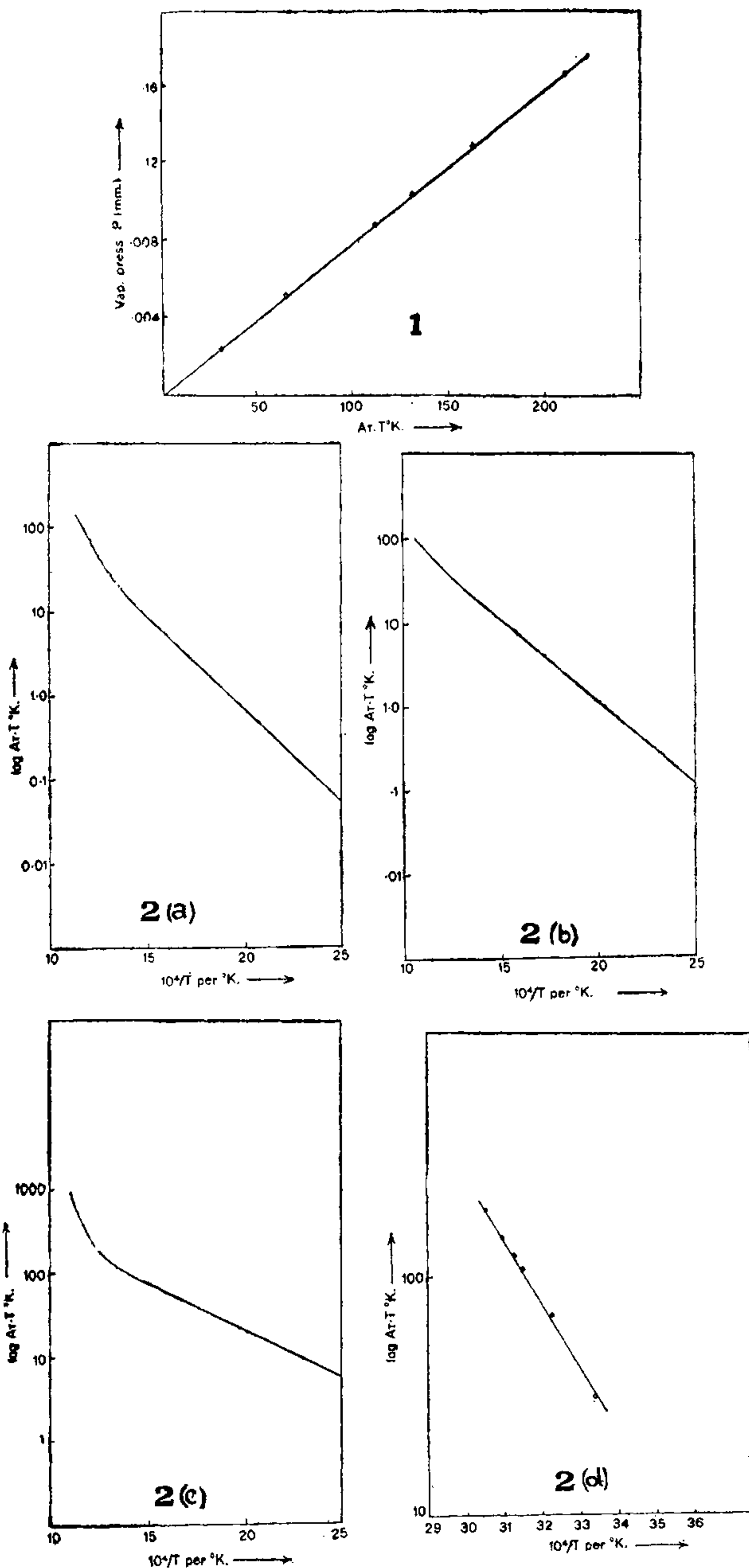
$$\log K_p \cdot A_T T = a + \beta/T$$

or

$$\log A_T T = a - \log K_p + \beta/T \quad (4)$$

i.e.,  $\log A_T T$  should bear a linear relationship with  $1/T$  in AAS measurements in the temperature range where the stipulation in relation (3) is valid.

A series of experiments were carried out in the temperature range of 350-1000° K. Metals Ag, Au and Mn used in the experiment were the specpure metals (Johnson and Mathey). These were placed respectively in the absorption cell as above. The cell chambers were flushed with argon then filled with the same to nearly atmospheric pressure and electrically heated to desired temperatures. Prior to taking readings on temperature and absorbance from the respective HC lamps, the argon gas flow was stopped for sometime in order to allow for the attainment of saturation vapour pressure. The linearity as envisaged in relation (4) is obtained in the lower ranges of the temperature for the metals Ag (3281 Å), Au (2428 Å) and Mn (2798 Å). The slopes are found to change in



FIGS. 1-2. Fig. 1. Vapour pressure *vs.*  $A_T T$  Curve for Hg. Fig. 2 a.  $\log A_T T$  *vs.*  $1/T$  Curve for Ag. Fig. 2 b.  $\log A_T T$  *vs.*  $1/T$  Curve for Au. Fig. 2 c.  $\log A_T T$  *vs.*  $1/T$  Curve for Mn. Fig. 2 d.  $\log A_T T$  *vs.*  $1/T$  Curve for Hg.



the neighbourhood of 700° K. and then tend to flatten to another linear domain (Fig. 2a-c).

The linearity at the lower temperature is obtained from pure sublimation process and the bending at higher temperatures is due to evaporation from a surface transformed from a solid surface to a quasi-liquid one. The same set of constants  $\alpha$  and  $\beta$  in Clausius-Clapeyron's equation does not hold under conditions of phase changes. No such change in slope was obtained with Hg—a liquid metal (cf. Fig. 2,d) where no phase change is

suspected in the temperature range (300–400° K.) of investigation.

It should be possible to calculate the absolute vapour pressures at different temperatures from considerations of relations (2) to (4) when the absolute vapour pressure is known at any one temperature. Further work is in progress and details will be published elsewhere.

1. Nesmeyanov, An. N., *Vapour Pressures of the Elements*, Translated and Edited by Carasso, J. L., Infosearch Ltd., London (Ed. 1963).

## TWO INTERESTING COPROPHILOUS FUNGI FROM INDIA \*

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**I**N the course of studies on the taxonomy and ecology of coprophilous fungi two interesting forms were collected both of which appear to be new to science and are described below.

### 1. *Tripterosporella coprophila* GEN. et SP. NOV. (FIG. 1)

The fungus produces cleistothecia that are scattered, superficial, globose, black and opaque, 315–600  $\mu$  in diameter, and covered with hairs. The hairs are brown, septate, up to 600  $\mu$  long and about 3  $\mu$  wide, paler towards the apex and rounded at the tips. The peridium of the cleistothecium is membranaceous and pseudoparenchymatous. The asci are clavate-fusiform, unitunicate, 8-spored, hyaline, evanescent and 180–280  $\times$  15–23  $\mu$ , the spore mass being 126–153  $\times$  15–19  $\mu$ . The paraphyses are thin and evanescent. The ascospores are biseriate, sometimes uniseriate or even triseriate especially during early stages of development, obliquely placed; they are at first continuous, long-cylindrical, hyaline, with a single row of refractive globules; the globules disappear later with the further development of the spores and their place is occupied by large vacuoles. When the spores

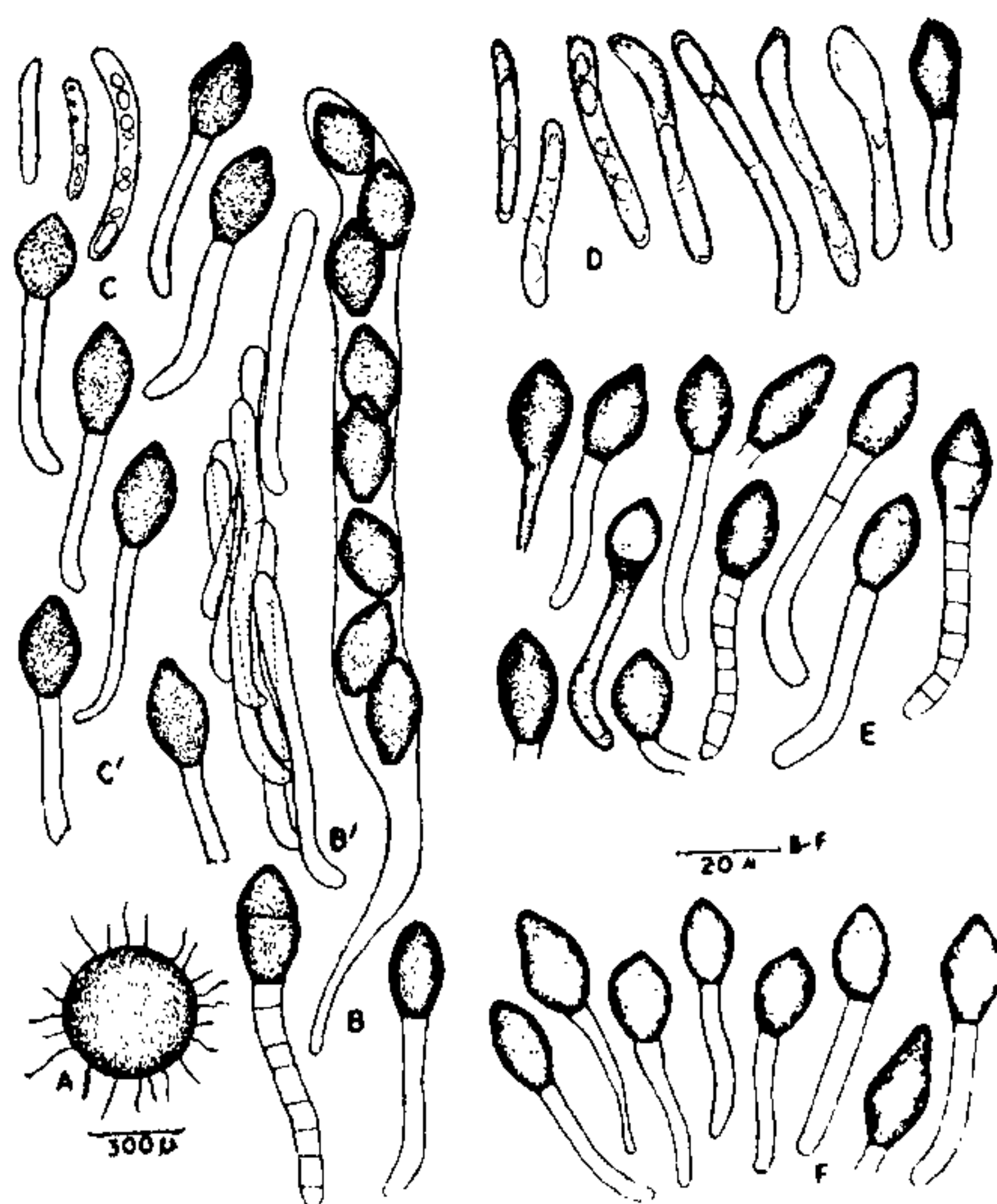


FIG. 1. *Tripterosporella coprophila* from type collection (Herb. RUBL No. 212). A, mature cleistothecium; B, ascus; B', ascospore-mass showing elongate filamentous aspect of young ascospores (ascus wall not shown); C showing stages of development of ascospores (juvenile stages); C', mature ascospores; D, stages in the development of ascospores; E, mature ascospores; note that tail-like cells of two ascospores are also pigmented; F, mature ascospores ex collection RUBL No. 196.

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