TABLE I
Cation exchange capacity of the soil and its size fractions*

Soil No.	Nature of soil	Depth (inches)	Soil	Silt (2–20 μ)	Clay (< 2 μ)
7	Dark grey ..	10–15	66·0	56·3 (10·8)‡	105·4 (63·2)‡
15	Reddish-brown ..	60–70	87·6	85·0 (20·8)	100·7 (34·3)
16	Weak-red ..	70+	78·0	82·3 (24·6)	108·6 (21·7)
23	Yellowish-brown ..	3–12	44·6	53·8 (9·7)	92·4 (31·9)
32	Dark grey (Black) ..	14+	39·6	56·7 (4·3)	108·5 (19·9)
33	Reddish-brown (Lateritic) ..	0–7	25·9	36·5 (3·6)	51·7 (20·2)
36	Black ..	0–6	60·6	58·1 (9·4)	95·7 (50·4)
38	Reddish-brown (Lateritic) ..	5–10	34·7	40·6 (5·7)	67·5 (32·1)

* C.E.C. was measured by the modified ammonium acetate method.[5] ‡ The values in parentheses indicate the contributions of the various size fractions to the C.E.C. of the soils.

In the course of a study of the genesis of basaltic (red and black) soils of Malwa Plateau, high cation exchange capacity of the soils, varying from 25 to 88 m.e. per 100 g., is observed. The soils have very low organic matter (average 0·5%) to account for the observed C.E.C. The C.E.C. of a few typical soils and their clay and silt separates is given in Table I. The results in Table I clearly bring out that the C.E.C. of some of the soils (Nos. 15, 16 and 32) cannot be explained by taking into consideration the contribution from silt and clay fractions of the soils. The mineralogy of the silt and clay size fraction of the soils, as determined by X-ray analysis, indicated the predominance of smectites in both the clay and silt fractions. This is in conformity with the observations of McAleese and Mitchell[2] that the seat of the high cation exchange capacity in the silt fraction does not lie in the silt-sized clay minerals and cannot be attributed to incomplete dispersion of the soil. There is thus an indication that coarser fractions definitely contribute to the C.E.C. of soils. Such a possibility was reported earlier in Australian and Ireland soil.[1-4]

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A NOTE ON MEGA AND MICROSPORE REMAINS FROM THE TERTIARY COAL OF MALAYA

THE Malayan coal has been generally regarded as unfossiliferous. Some Dutch workers investigated this coal, but they could not recover any fossils. The present study, however, has revealed that the coal is highly fossiliferous. Coal samples were collected by one of us (B. S. T.) in 1954 from near Kuala Lumpur, Malaya. Fungi from this coal were earlier described by Trivedi and Chaturvedi (1961). The coal on maceration yielded large number of microspores, cuticles, megaspores, fungal bodies and insect remains. A few spores representing the various groups of plants are described here.

DESCRIPTION

FUNGI: *Brachysporium* sp. (Fig. 1)

Spores two to several celled, somewhat cylindrical in shape, 30 × 15 μ in size, upper two cells are more dense, basal cell gradually narrower, ending in a short stalk, cross-wall thick, 3 μ in width, apex rounded, spore wall 1 μ wide, surface smooth.

BRYOPHYTA: *Sphagnum* sp. (Fig. 2)

Spore 20 × 23 μ in size, triangular, with round corners, rays reach the equator, spore has slight thickening of the wall beyond the ends of trilete arms, rays 7–13 μ in length, spore wall 0·5–1 μ thick, surface smooth, brown in colour.

PTERIDOPHYTA: *Anemia* sp. (Fig. 4)

Spore triangular in shape, anterior side somewhat pointed, 53 × 60 μ in size, exine 1·5–2 μ thick, surface echinate and striated, striations unbranched rarely branched, 3–4 μ thick, numerous and closely packed, space between two striæ narrow, trilete laesurae narrow and not reaching the periphery.

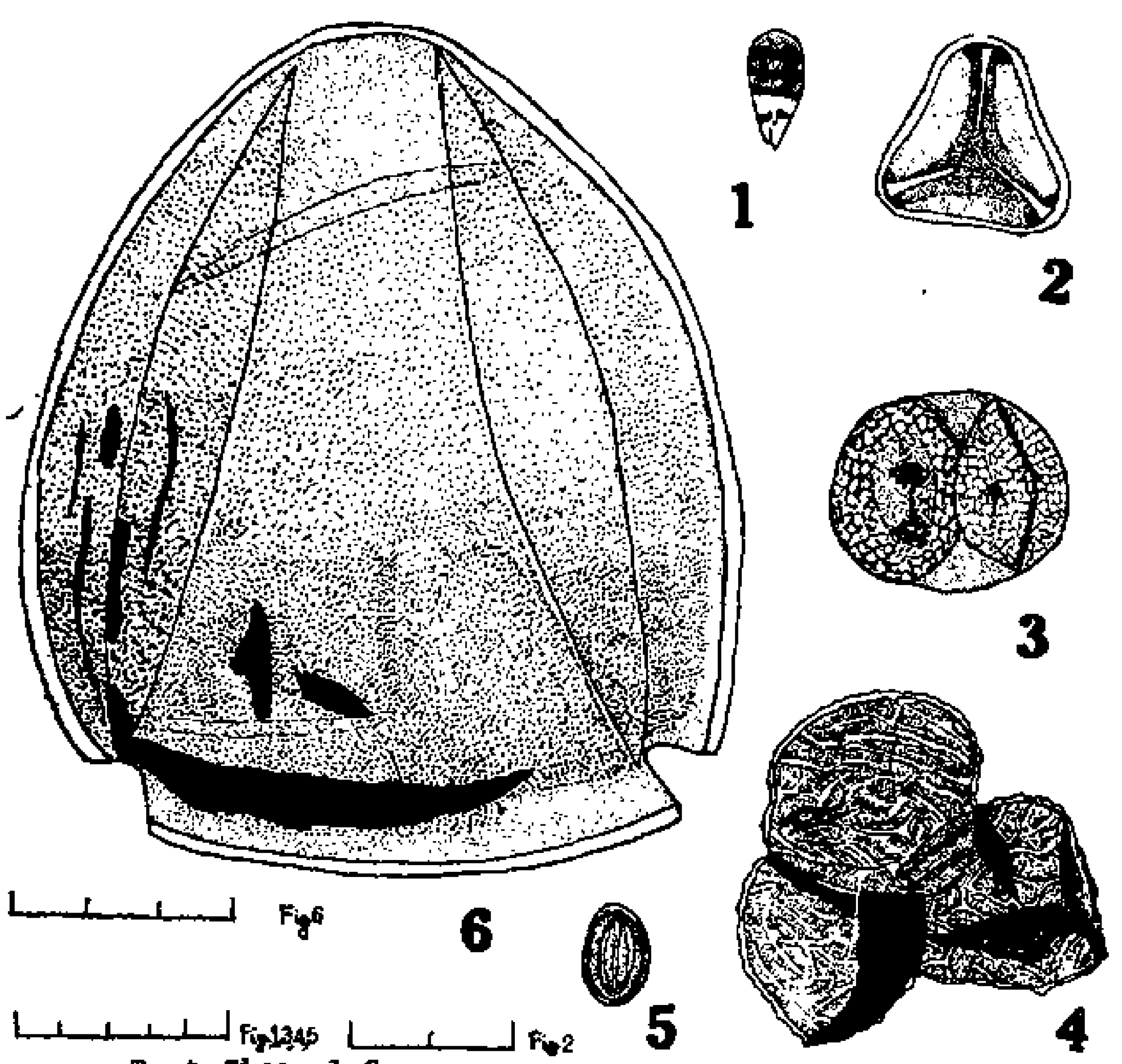
GYMNOSPERM : *Podocarpus* sp. (Fig. 3)

Body of the pollen grain circular in outline, 56 × 53 μ in size, exine 1–1·5 μ thick, smooth and granular, two bladders usually bent towards the centre of the pollen grain, bladders quite large and reticulate.

ANGIOSPERM : *Quercus* sp. (Fig. 5)

Grains small spherical or somewhat oblately flattened in outline, Furrows longitudinal, comparatively narrow, grains widest at the equatorial plane, exine 1–1·5 μ thick, covered with very small warts.

MEGASPORE : *Calamospora* sp. (Fig. 6)



FIGS. 1–6. Fig. 1. *Brachysporium* sp. Fig, 2. *Sphagnum* sp. Fig. 3. *Podocarapus* sp. Fig. 4. *Anemia* sp. Fig. 5. *Quercus* sp. Fig. 6 *Calamospora* sp.

Spore large, round to spherical, 960 × 1120 μ in diameter, interapical sides convex, exospore 16 μ thick, finely granular, forming a mat-like stracture, trilete sutures obscure, lips open, læsuræ each 820 μ long reaching more than half the spore body, folds present.

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CALORIMETRY WITH REFERENCE TO A TROPICAL FISH

IN this note we discuss the calorific estimations made by three well-known direct methods to study the energy turnover in a tropical fresh-water fish *Ophiocephalus punctatus*. In the first method an oxygen bomb calorimeter manufactured by a firm in India was used. The instrument was a plain jacket (diabatic), single valve calorimeter similar to the well-known Parr bomb.[1] The two other methods are : (1) that by Vinberg *et al.*[2] as modified by Ivlev,[3] and (2) that by Karzinkin and Tarkovskaya.[4]

In the last two methods, known also as wet combustion, the weight of sample used is as low as 8 to 10 mg. of dry material which is a great advantage, particularly for work on micro-organisms where the amount of material available for estimation is a crucial factor.[4] Between the two wet methods Karzinkin's method is direct and does not involve, as in Ivlev's method, a separate estimation of protein on account of its incomplete combustion. We are unable to know from the reference available to us whether, in fact, this is true of Karzinkin's method itself. Contrary to this claim the values obtained by Ivlev's method are higher by 1·5 to 4% over the other (*vide* Table I). Further, although slightly involved,

TABLE I

Test material	Calories per gram dry weight of ash-free material		
	Oxygen bomb method	Karzinkin's method	Ivlev's method
Ophiocephalus ..	5301·842	4499·014	4568·120
do. (after feeding)	5686·032	5035·076	5154·502
Fæces ..	3908·380	3317·570	3437·636

in Ivlev's method one has to collect data on protein level in the material, which is itself a useful information to have on hand. However, when both the sets of values were compared with those of the oxygen bomb, it was found that the latter values were between 11 and 16% higher than the values of Karzinkin's method.

When the three methods are compared the oxygen bomb method is certainly advantageous because of its accuracy. Contrary to what was