

The types at present missing from this collection are :—

SPECIES.	PLATE.	FIGURE.	PAGE.
<i>Turritella plebeia</i> ...	vii	1	125
<i>Natica interna</i> ...	vii	2	125
<i>Fusus 4-costatus</i> ...	vii	5	127
<i>Fusus cinereus</i> ...	vii	7	129, 410
<i>Pecten Madisonius</i> ¹ ...	—	—	134
<i>Arca arata</i> (right valve)...	x	1	137
<i>Arca centenaria</i> (left valve)...	x	2	138
<i>Arca incile</i> (right valve)...	x	3	139
<i>Nucula laevis</i> ...	x	5	141
<i>Nucula concentrica</i> ...	x	6	141
<i>Venericardia granulata</i> ...	xii	1	142
<i>Tellina aequistriata</i> ...	x	7	145
<i>Lucina subobliqua</i> (described, not figured)	—	—	147
<i>Lucina cribraria</i> ...	xiii	1	147
<i>Venus deformis</i> ...	xii	2	148
<i>Cytherea convexa</i> (left valve)...	xii	3	149
<i>Astarte undulata</i> ...	ix	5	150
<i>Astarte vicina</i> ...	ix	6	151
<i>Amphidesma subovata</i> (left valve)...	x	10	152
<i>Corbula cuneata</i> ...	xiii	2	152
<i>Corbula inaequale</i> ...	xiii	3	153
<i>Serpula granifera</i> ...	viii	4	154

V.—OCCURRENCE OF RADIOLARIA IN GONDWÁNA BEDS NEAR MADRAS.

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(PLATE XVII, Figs. 1-6.)

THE Upper Gondwána (Rajmahál Series) beds near Madras are divided into two groups, the lower of which has been named from Sripermatúr, a town 25 miles west-south-west of Madras, and a well-known locality for fossil plants. The group is composed of white and pale buff-coloured shales containing plants, at least 10 feet in thickness, resting upon sandstones, grits, and micaceous sandy shales, at least 15 feet in thickness, whose base is not seen, but which probably rest on the gneiss. Silicified wood occurs in some of the gritty beds. The other fossils occur in the shales, and consist of plant and animal remains. The latter are poor, and comprise two or three indeterminate species of ammonites and several lamellibranch bivalves.

Last year, while staying at Madras I paid a short visit to Sripermatúr, accompanied by Mr. Ranga Chari, M.A., of the Madras University. I did not obtain many plant-remains, but was struck by the very porcellanic character of the shales containing them. These are thin-bedded, white to cream or pale coffee-coloured, and often have a smooth conchoidal fracture. A few specimens were collected from a wayside exposure, on the track between Sripermatúr and Vellum. In the thin slices cut from these specimens Radiolaria are to be seen, though for the most part in a very poor state of preservation. These organisms, together with tiny fragments of elastic quartz, and rarely a few carbonaceous specks, are embedded in a fine siliceous paste which remains dark between crossed nicols. Quite locally chalcedonic patches show a fibrous structure. The

¹ This species is described without a figure: the type is said to be in the Museum of the Academy of Natural Sciences, Philadelphia.

fragments of clastic quartz are rarely as large as the Radiolaria, and graduate downwards to the finest dust. Very minute bedding is clearly seen in the slides. The finer material seems to contain, or to be aggregated into, small globular masses, some of which are rather conspicuous, but very possibly not of organic origin.

Dr. Hinde has very kindly examined the slides, and says "there can be no doubt that the organisms are radiolaria." "Probably several forms are present, most of them rounded or lens-shaped discs with minute reticulate structure and without radial spines; others are oval with spines, and one form is like a sugar-loaf in section." In some cases there is a body with reticulate structure within a clear circular area; this may indicate the presence of radiolarian forms with the inner test better preserved than the outer.

There are also in the slides some groups of small rounded bodies, of inconstant dimensions, which, as stated above, are probably not of organic origin. Dr. Hinde thinks that the disc or lens-shaped forms with reticulate structure (Figs. 5, 6), which are by far the most abundant forms present, belong to the genus *Spongodiscus* in the Discoidea section. The conical perforate form (Fig. 4) probably belongs to the genus *Dictyomitra* in the Cyrtioidea division. The spined forms (Figs. 1-3) are too faintly shown for determination, but may belong to the Discoidea section.

The association of these radiolarian forms with plant-remains (the shales are known as plant-beds, though the plant-remains are not very abundant; I found no mollusca myself) is of great interest, as the shales must have been deposited in *comparatively* shallow water, a state of things also indicated by the detrital character of the other beds included in the Sripermatūr group. The shales cannot, however, have been formed very near the shore. Mr. Foote says that they "show every evidence of having been deposited in perfectly tranquil water at sufficient depths probably to be beyond the agitation of the waves. The fragmentary nature of the fronds and leaves appears to indicate that they were drifted out to sea" (Mem. Geol. Surv. India, vol. x, p. 64, 1873). The most porcellanic shales seem to contain the best preserved plants.

The Radiolaria must have been present in sufficient quantity to give a very siliceous character to the rock, yet the use of the term 'radiolarian chert' would hardly be justified. I might add that Radiolaria are to be found at the present day in shallow water, though not in such abundance as in the open ocean.

Finally, I desire to thank Dr. Hinde for his very kind assistance and advice.

REFERENCES.

- Mem. Geol. Surv. India, vol. x, p. 64, 1873.
Paleont. Indica, ser. ix, p. 236, 1875.
Geology of India, 2nd ed., pp. 182, 208, 1893.

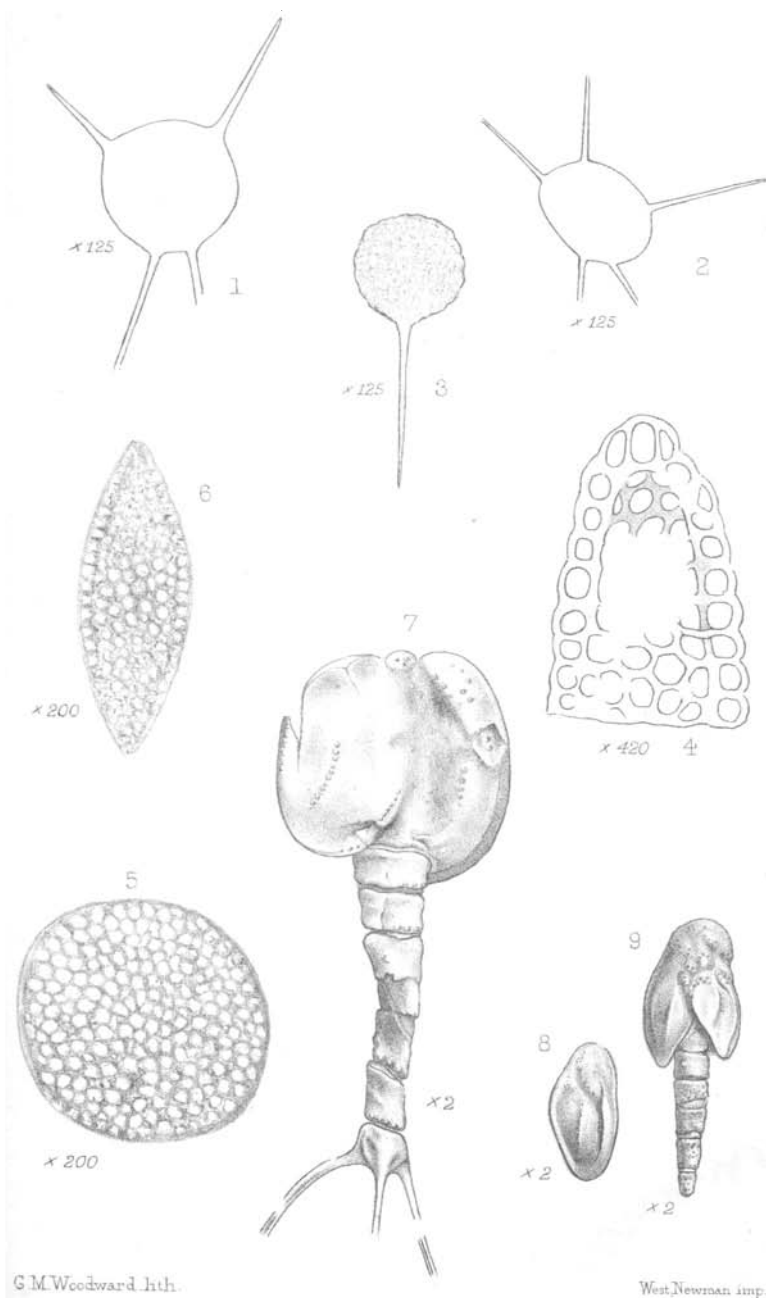
EXPLANATION OF PLATE XVII.

RADIOLARIA FROM UPPER GONDWANA BEDS, SRIPERMATŪR.

FIGS. 1-3.—Spined forms, possibly belonging to the section Discoidea; outlines only distinguishable; $\times 125$.

FIG. 4.—Conical reticulate form probably referable to the genus *Dictyomitra*, $\times 420$.

FIGS. 5, 6.—Lenticular reticulate form perhaps belonging to the genus *Spongodiscus*, $\times 200$.



Figs. 1-6. Radiolaria.
from Madras.

Figs. 7-9. Echinocaris.
from Devonshire.