

# Insect remains from Upper Triassic sediments of Satpura Basin, India

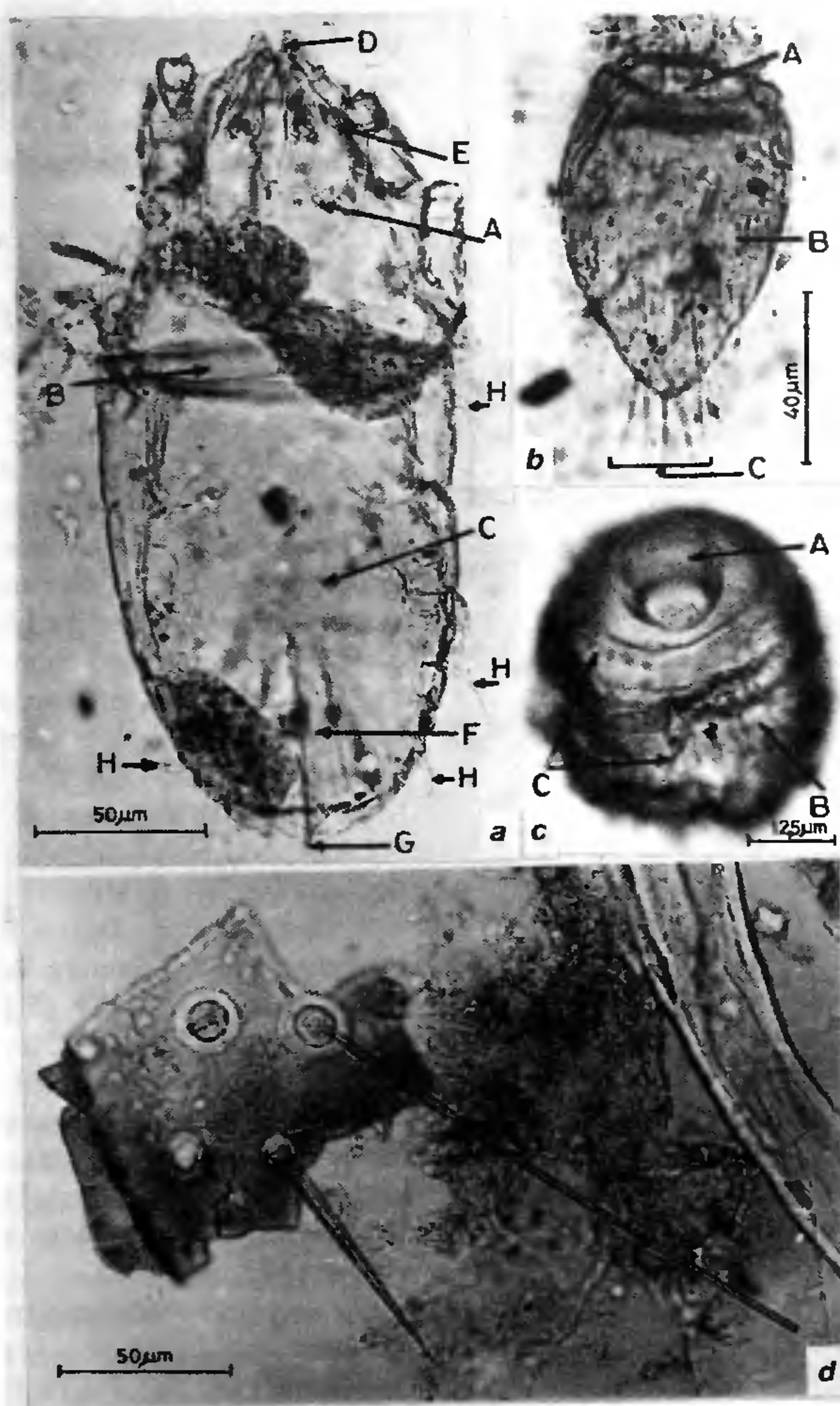
This note communicates the first occurrence of three different fossilized microscopic wingless parasitic insects as well as a few fragmented parts of cuticle of different insects along with setae of various lengths (only one fragment

which does not belong to these three insects is shown here). The complete insect (Figure 1a) and cuticle of a different insect (Figure 1d) have been recorded from the matrix (yellowish-reddish sandy clay) of overlying Bagra

Conglomerates exposed at Khatama caves (30°19':77°45') Hoshangabad district, Madhya Pradesh (MP) (Figures 2, 3). Two complete insects (Figure 1b, c) have been recorded from the subsurface clay bands exposed in an artesian well-cutting at the village Anthoni (22°38':78°21') in Chhindwara district, MP (Figures 4, 5). The Denwa Formation (underlying) and Bagra Formation (overlying) are the highest units of the Mahadeva Group. The former, based on the occurrence of labyrinthodont fossil *Mastodonsaurus indicus* Lydekker, 1885 from Denwa beds near Jhirpa, was assigned to Late Triassic age (Keuper)<sup>1</sup>. However, Krishnan<sup>2</sup> considered the presence of *M. indicus* (allied to *Capitosaurus* and *Metapias*) indicative of a Rhaetic age. He viewed upon the age of Denwa beds and Bagra conglomerates as Muschelkalk to Keuper and Rhaetic or Rhaetic-Lias, respectively<sup>3</sup>. It is suggested that upper part of Lower Triassic to Middle Triassic age for Denwa Formation and Rhaetic? for Bagra<sup>4</sup>, palynologically, assigned Carnian to Norian age for Denwa Formation<sup>5</sup>. From the Denwa/Bagra sediments, spore/pollen, dinocysts, fungal remains, trachieds, etc. have also been recorded<sup>6</sup> and assigned, palynologically, the Denwa Formation Norian to Rhaetic in age.

The generalized sequence (as given in ref. 4) is summarized in Table 1 (in part).

The insect (Figure 1a) and cuticle (Figure 1d) have been recorded from matrix of Bagra conglomerates (Sample 1) exposed in the Zamani Nala (Figures 2, 3) near Khatama caves. The Bagra conglomerates have been formed from different kinds of rounded boulders of quartzites, banded jaspers, jasperoid conglomerate, which are loosely cemented by argillaceous matrix (yellowish to reddish sandy clay). The insects (Figure 1b, c) have been recovered from the Denwa clays (Sample 7) from a well-cutting section at the village Anthoni (Figures 4, 5). Denwa clays are always calcareous and often contain numerous calcite nodules. They vary in colour between white and green, red and



**Figure 1.** a, Complete male fossil insect showing three parts of dorso-ventrally flattened body—head (A), thorax (B) and abdomen (C), saw-like mouth part (D), cone-shaped mouth part (E), genitalia (F), sclerotized part (G), branched setae (H), on body (230 µm long, 105 µm broad). BSIP Sl. no. 12501 (stage coordinates 15 × 99); b, Insect having pear-shaped body showing head and thorax fused to form cephalothorax (A) and abdomen (B) with setae (C) (88 µm long and 60 µm broad). BSIP Sl. no. 12053 (SC 17 × 99.5); c, Insect having rounded body (43 µm long and 38 µm broad), showing head and thorax fused to form cephalothorax (A) and abdomen (B) with setae (C). BSIP Sl. no. 12054 (SC 28 × 94.5); d, Fragmented part of cuticle of an insect showing long (80 µm) and elongate (160 µm) setae with their sockets, and three sockets (14–22 µm) without setae. BSIP Sl. no. 12052 (SC 23 × 103.5).



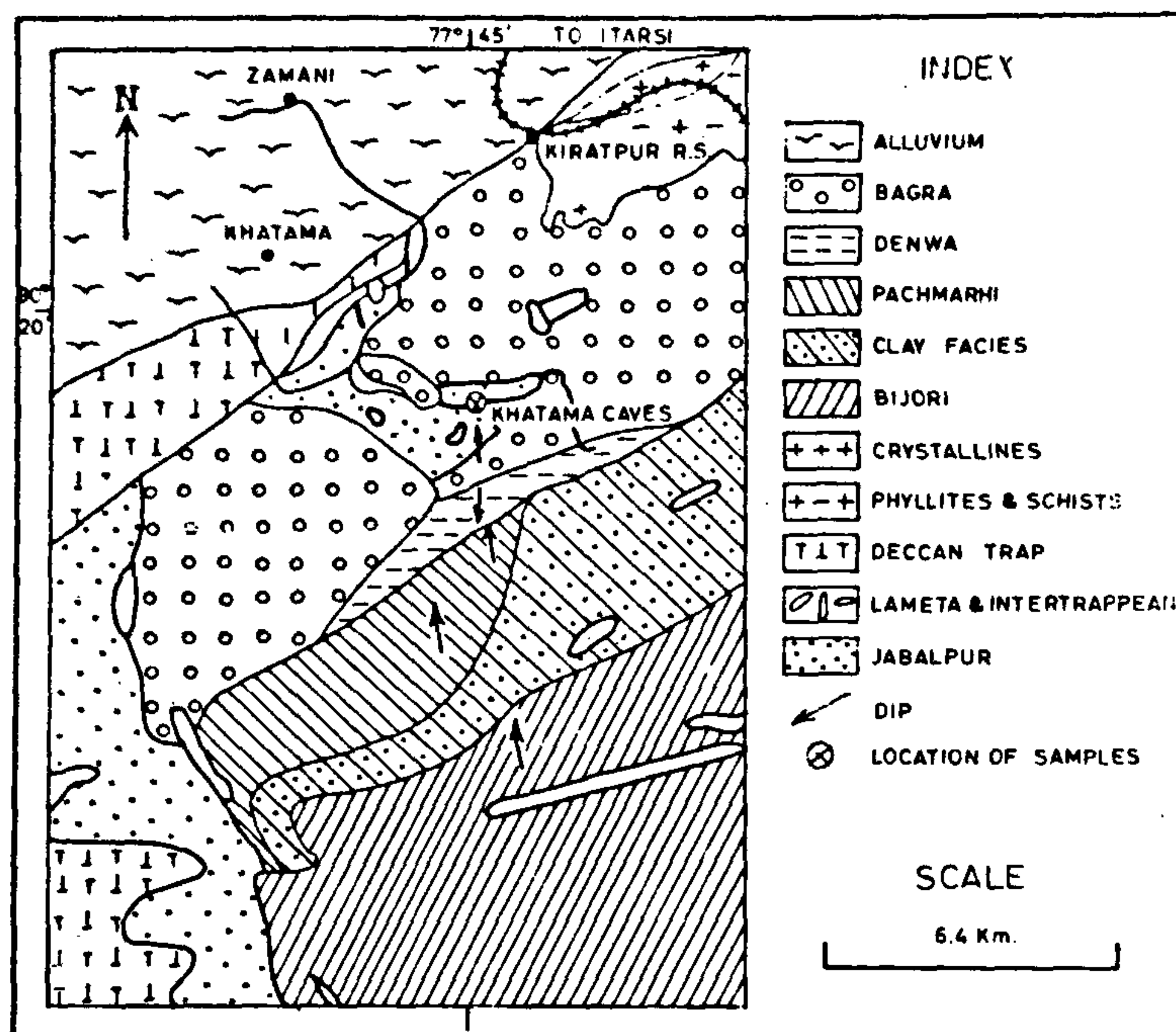


Figure 2. Geological map of the area showing location of the rock samples near Khatama caves. (after Crookshank<sup>1</sup>).

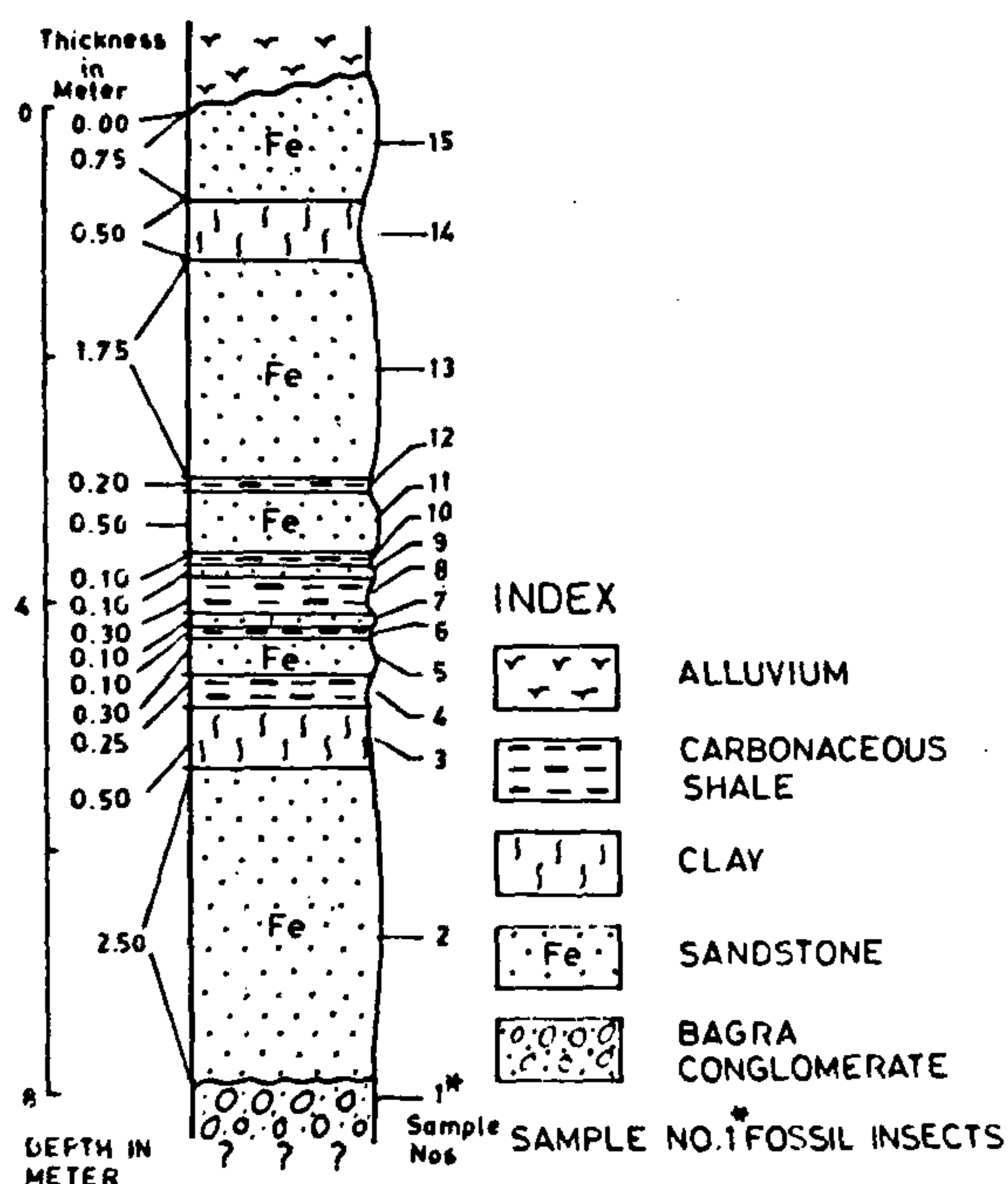


Figure 3. Stratigraphical sequence exposed in Zamani Nala near Khatama caves, Hoshangabad district, MP.

buff. The red ones are the most characteristic. Denwa sandstones are softer and less important. Red jasper pebbles are common.

The complete insect (Figure 1a), is dorso-ventrally flattened, comprising three parts of a typical insect – head (A) prognathus type, thorax (B) and abdomen (C). Its mouth parts are eight in number which are saw-like (D) and cone-shaped (E), to bite and sometime nibble the skin of host. It also shows the presence of external genitalia (F) in the terminal part of the abdomen. Some of its sclerotized part (G) is extended which confirms that this specimen is a male insect. The whole body is mostly decorated with branched setae (H), brownish pigmented.

Locus typicus – Khatama caves, Hoshangabad District, MP.

Stratum typicum – Bagra Formation, Mahadeva Group, Satpura Basin, MP, BSIP, Slide no. 12051.

The insects in Figure 1b, c have a pear-shaped, and rounded-body, respectively, covered with simple setae of various lengths (C). These specimens may be ectoparasitic form on animals, because the presence of different lengths of setae provide them protection from predators. The body is divided into two parts, head and thorax are fused to form a small cephalothorax (A) and the remaining larger part is the abdomen (B).

Locus typicus – Anthoni village, Chhindwara district, MP.

Stratum typicum – Denwa Formation, Mahadeva Group, Satpura Basin, MP, BSIP, Slide no. 12053 (Figure 1b), 12054 (Figure 1c).

Figure 1d is a fragmented part of a cuticle of another insect having simple long (80  $\mu$ m) to elongate setae (160  $\mu$ m) with well-defined sockets (12–22  $\mu$ m). The surface of the cuticle is slightly structured or sculptured.

Locus typicus – Khatama caves, Hoshangabad district, MP.

Stratum typicum – Bagra Formation, Mahadeva Group, Satpura Basin, MP, BSIP, Slide no. 12052.

Fossil lice are not known<sup>7</sup> so far, but the present complete insect seems to be a fossil of mallophagan type of lice as it shows prognathus type of conical head<sup>8</sup>, arrangement of setae on the body (chaetotaxy), pigmentation pattern and shape of male genitalia of mallophagan type ectoparasites<sup>9</sup>. Mason and Mar-

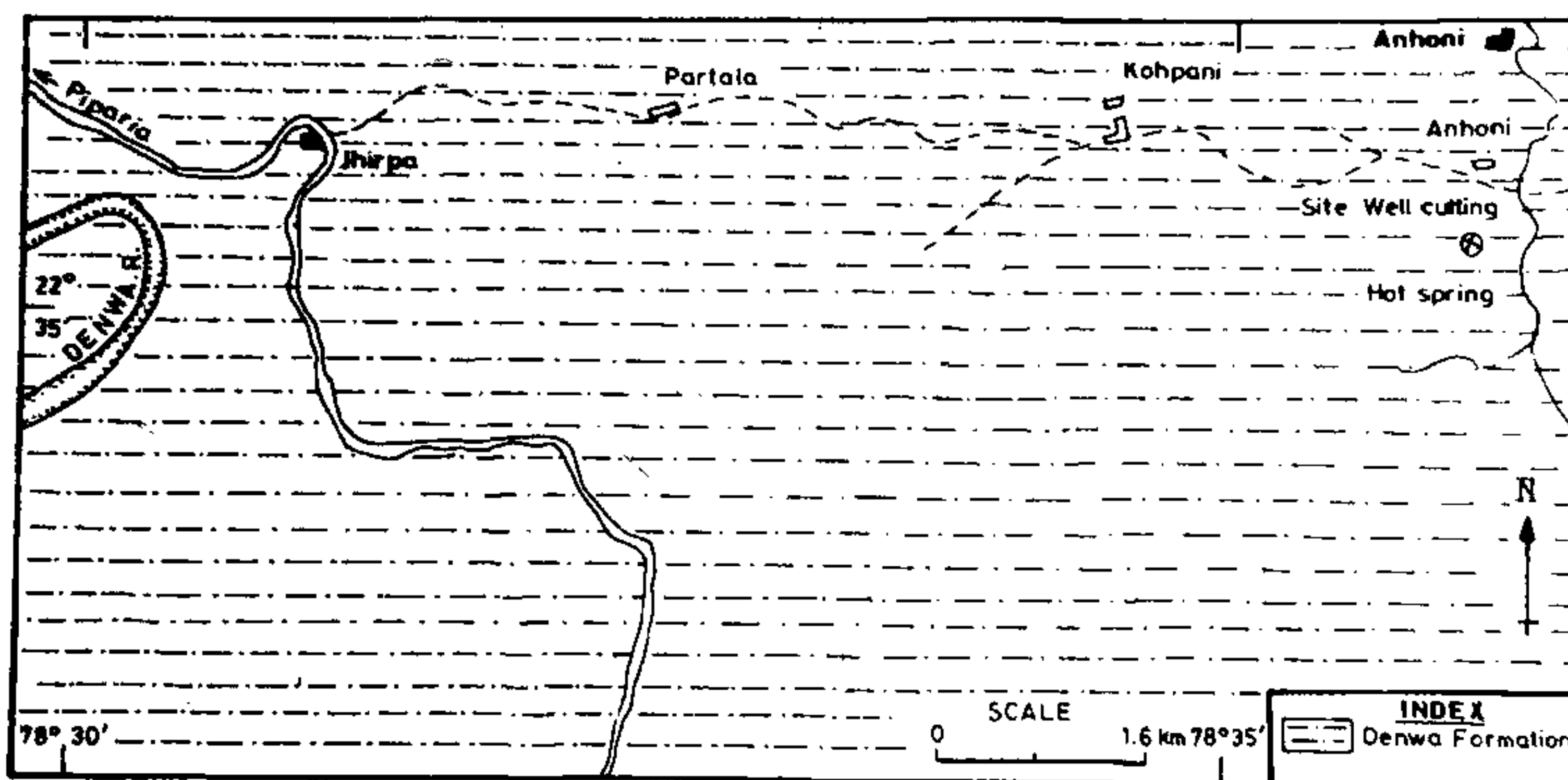


Figure 4. Geological map of Anthoni area showing site of well-cutting (after Raja Rao<sup>4</sup>).

Table 1. Generalized stratigraphic sequence of Satpura Basin

Age	Formation	Lithology (thickness)
Lower Cretaceous	Jabalpur	Massive sandstones with jasper, conglomerates, white clays, red clays, carbonaceous shales and coal lenses (50–100 m)
Unconformity		
Rhaetic?	Bagra	Predominantly coarse conglomerates with bands of calcareous sandstones variegated clays, limestone and dolomite (180–240 m)
Unconformity		
Upper part of Lower Triassic to Middle Triassic	Denwa	Soft variegated clays interbedded with sandstone bands, conglomeratic at places (about 350 m)
Lower Triassic	Pachmarhi	White coarse grained cross-bedded sandstones with lenses of sub-angular quartz pebbles (about 750 m)
Permian	Bijori	Micaceous, flaggy sandstones and shales at places micaceous (180–250 m)

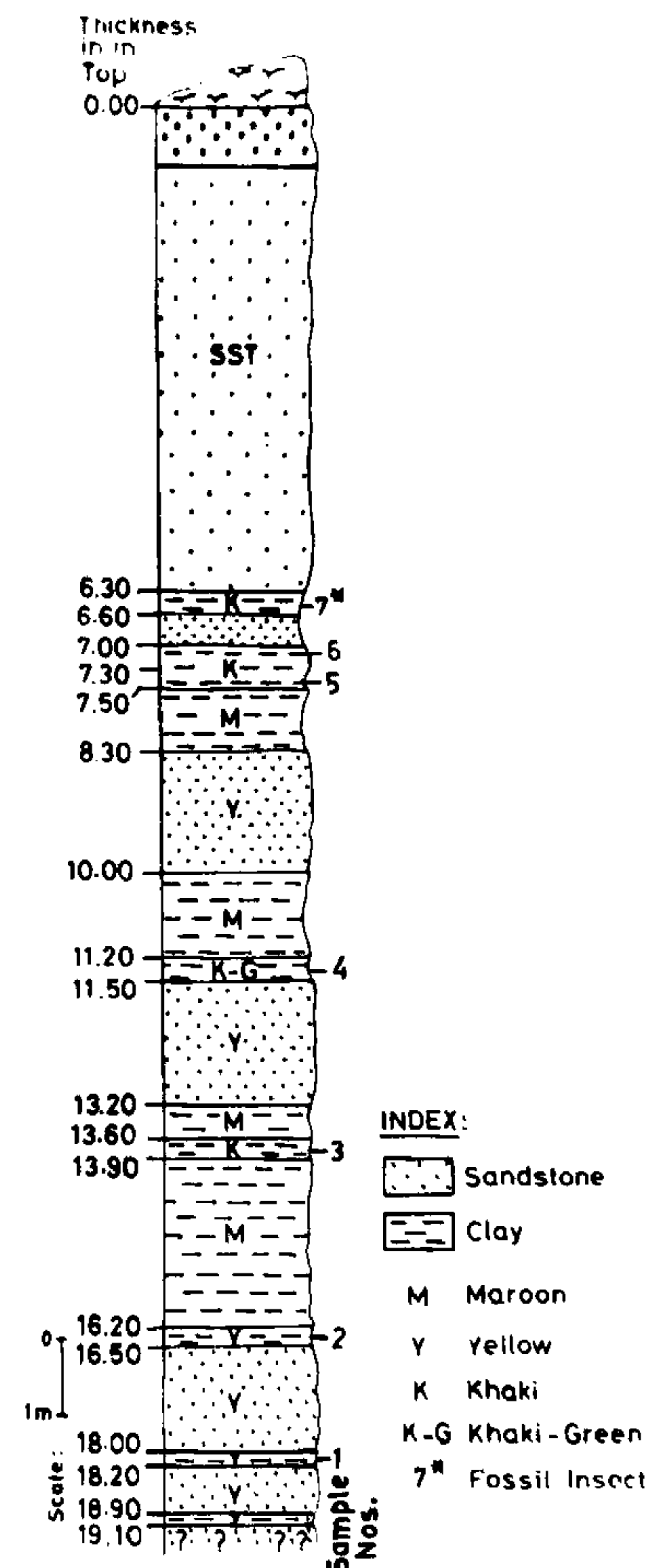


Figure 5. Stratigraphical sequence exposed in a well-cutting at Anthoni, Chhindwara district, MP.

shall<sup>10</sup> pointed out that bones of early mammals were present during the early days of Mesozoic era, i.e. about 200 m.y. ago (Late Triassic). Datta and Das<sup>11</sup> have recorded the oldest mammalian fossil tooth from Tiki Formation (Late Triassic) of South Rewa Gondwana Basin, MP, India, which is neighbouring Satpura Basin. So, it must have connections with wandering mammals and it is presumed to be of same age group.

These citations show that the present fossil insects might have evolved during Late Triassic having ectoparasitic habitats on mammals.

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