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浙江宁国頁岩中一个新的多枝笔石

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本文所描述的新笔石——浙江三叉笔石 (*Tridensigraptus zhejiangensis* gen. et sp. nov.),是笔者于1963年5月在浙西杜泽附近的下奥陶統宁国頁岩 *Didymograptus hirundo* 带中采集的。共有三块标本,其中一块較为完整,都保存为压平的薄膜,一般枝的背面向上,腹面向下,只在个别枝上出露胞管,可以看出是属于均分笔石式 (Dichograptid type)。这种笔石的形体大,平伸生长。其側枝的高度发育和沿主枝对称排列的形状,給人以整齐美观的印象。这种側枝高度发育和对称生长形式的下奥陶統多枝笔石,还是第一次发現,其分枝的芽生方式,还有待于进一步的闡明。

作者在进行这項研究工作时,承許杰教授指导并修改中英文稿;穆恩之教授也曾給予不少指示;郭凤九、陈殿丰二同志代为照相;曹恩荣同志代繪插图,均于此表示深切的謝忱。

全笔石科 Hologaptidae Mu, 1950

三叉笔石属(新属) *Tridensigraptus* (gen. nov.)

特征: 笔石体平伸生长,第一、第二两級枝为正分枝。一級枝很短;二級枝甚长,有四条主枝。每条主枝的两側又对称地生长1—5对側枝。主枝与其两旁对称排列的側枝,状如古代的三叉戟。少数側枝又可在两側生长对称的側枝。胞管为均分笔石式。

属型: *Tridensigraptus zhejiangensis* (新属,新种)

分布: 中国浙江西部下奥陶統。

比較: 新属与全笔石属較为接近,其主要差别在于:这一新属的側枝是沿主枝两側对称排列,較有規則。

浙江三叉笔石(新属、新种) *Tridensigraptus zhejiangensis* (gen. et sp. nov.)

(图版I, 图1; 图版II, 图1—6; 图版III, 图1—3)

材料: 共有三块标本(号碼: 1836, 1837, 1838)及其反对面。1836为正型标本。

特征: 笔石体很大,直径約为22厘米,水平伸展;横索短;四个主枝甚长;沿主枝两側对称生长側枝1—5对,側枝緩緩弯曲;主枝与側枝的寬度大致相等;側枝与主枝之間的夹角为40°—80°;少数側枝又可生出对称的側枝。胞管为直管状,每10毫米中有6—7个胞管。

描述: 笔石体直径长224毫米。胎管保存模糊。两个平伸的一級枝,很短,它們連成一条横索,长7毫米,寬1.5毫米;主枝长108毫米,最长的側枝为85毫米,愈向主枝的末

部，侧枝愈短。四个主枝分枝的距离和次数不等。第一对侧枝与横索的距离为 8—12 毫米；第二对侧枝与第一对侧枝的距离为 17—20 毫米；第三对侧枝与第二对侧枝的距离为 23—27 毫米；最后两对侧枝的距离有变短的趋势；第四对侧枝与第三对侧枝的距离为 22 毫米；第五对侧枝与第四对侧枝的距离为 17 毫米。个别侧枝在距离其始端 35 毫米之处，向两旁再分出一对对称的侧枝。

标本保存的情况常以枝的腹面向下，背面向上。由于被挤压的程度和方向不同，枝的保存宽度不一（1.5、2 到 3.5 毫米）。各枝的背面在受压而宽度增大；同时由于被压扁和裂开，在枝的背面的中間常出現一条縱向的突起綫和一系列横向的突起綫，它們与背面两侧边緣形成两排长方形的格子（图版 II，图 4—6；插图 1）。

这条縱向的綫，是笔石枝原有的背緣；一系列横向的綫可能是在受压时所产生的张力裂縫，被矿化物质填充而后呈突起之状。

在少数較宽的侧枝（3.2—3.5 毫米）上，可見一系列保存較为完好的胞管侧面（插图 1；图版 II，图 5—6），呈直管状，长 3 毫米，口宽 0.8 毫米，掩盖 2/3，口緣直，腹緣直或稍內凹，傾角为 35°，每 10 毫米中有 6—7 个胞管。

值得注意的是标本 1838（图版 II，图 2a—b），其分枝能力特别強，仅在主枝上 36 毫米的范围內，即生长 3 对侧枝，并且在同一对侧枝上，又各自再生一对小的侧枝，这是其他标本所沒有的現象，其层位較低，可能为另一个新种。因这类标本只有一个，而且保存不全，故暫列入本种之內。

討論： 新属和全笔石科（Holograptidae Mu, 1950）的其他各属一样，笔石体水平伸展，四个主枝具有侧枝，胞管为直管状，产自下奥陶統。单就它們平鋪的四个主枝来看，很象平鋪的四笔石。按全笔石科各属的主枝上的分枝均为同分枝（称侧枝），从形态上来看，新属每对侧枝是从主枝两旁对称的两点（同一胞管上）上同时伸出（图版 II，图 4—5；插图 1），侧枝的长度和宽度也与其在一处伸出的主枝相一致（图版 I，图 1；插图 1），因此笔者認为新属也可能为同分枝。但是同分枝的笔石，不論是正分枝还是侧分枝，都是由一个双芽胞管同时生出两个胞管，然后又各自芽生而成为两枝的。新属在同一处有三个枝（两个侧枝和一个主枝）生出，如确是同生枝，則应是一个三芽胞管同时生出三个胞管又各自芽生而成为三枝的；而这种分枝方式在全笔石科以及前人描述过的其他笔石类里是不曾見过的。新属和孿笔石（*Syndyograptus*）及偶笔石（*Amphigraptus*）的分枝驟然看去有些相似，即沿主枝的两侧成对的分枝，但后两属的分枝是后生的次枝，而非同生；且胞管为紆笔石式，而非均分笔石式。由于新属的一、二級枝为正分枝，且有侧枝，胞管为均分笔石式，故暫列入全笔石科。至于在分枝处的胞管芽生方式及其与全笔石科其他各属的演化关系，尚待找到更多更好的标本后进一步加以研究。

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A NEW MULTIRAMOUS GRAPTOLITE FROM NINGKUO SHALE OF ZHEJIANG

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The specimens of the new multiramous graptolite, *Tridensigraptus zhejiangensis,* gen. et sp. nov., were collected by the writer from the *Didymograptus hirundo* zone of the Ningkuo shale (L. Ord.) at Duze, western Zhejiang (Chekiang). The rhabdosome is large in size and has its main stipes and lateral branches all spreading out in a horizontal plane. The symmetrical arrangement of both the main stipes and the lateral branches is the most attractive character, by which it is distinguished from all the other multiramous genera. Because of the fact that its main stipes are produced by dichotomous division from a primitive *Didymograptus* stage and that its thecae are of the Dichograptid type, the new genus is provisionally placed in the family Holograptidae.

Family Holograptidae Mu, 1950

Genus *Tridensigraptus*, gen. nov.

Rhabdosome large, with four horizontal main stipes produced by dichotomous division from a short funicle. From each of the main stipes, several pairs of lateral branches are given off at subregular intervals, each pair of them being symmetrically arranged on two sides of the main stipe. The convergence on the division point of the three branches, that is, the continued extension of the main stipe in the middle and the two lateral branches on the two sides, presents an appearance approaching to that of an ancient trident. The thecae are of the Dichograptid type.

Genotype: *Tridensigraptus zhejiangensis,* gen. et sp. nov.

Distribution: L. Ordovician, W. Zhejiang (Chekiang)

Tridensigraptus zhejiangensis, gen. et sp. nov.

(Pl. 1, fig. 1; Pl. II, figs. 1—6; Pl. III, figs. 1—3)

Material: Three specimens (Nos. 1836, 1837, 1838) with counterparts. Specimen No. 1836 is the holotype.

Diagnosis: Rhabdosome about 22 cm in diameter, with a very short funicle and four long, rigid main stipes; 1—5 pairs of slightly curved lateral branches arising symmetrically from each of the main stipes at an angle varying from 40° to 80°; lateral branches being equal in width to the main stipes; their length decreases with the remoteness of the point of their origin from the initial end of the main stipe; a few of the lateral branches give off short lateral branches in their turn. Thecae simple tubes, numbering 6—7 in 10 mm.

Description: The rhabdosome measures 224 mm in diameter; the sicula is only dimly shown; the stipes of the first order form together a short funicle which is about 7 mm long and 1.5 mm wide; the main stipes are about 108 mm long and 2 mm wide; the length of the lateral branches decreases with remoteness from centre of the rhabdosome. The lateral branches nearest to the centre are most fully developed, measuring about 85 mm in length. Distances between the originating points of the lateral branches increase with the remoteness from the initial end of the main stipe. The first pair of the lateral branches are given off at a distance of about 12 mm from the initial end of the main stipe. The distance between the points of origin of the first and second pairs and that between the second and the third are 17—20 mm and 23—27 mm respectively. The distance, however, is reduced after the development of the third pair, as the interspace between the third and the fourth pairs is only 22 mm and that between the fourth and the fifth 17 mm. From one specimen, the holotype (pl. 1, fig. 1; text-fig. 1), it is observed that one of the lateral branches gives off again a pair of short lateral branches.

All of the specimens are strongly flattened, and their branches are generally so preserved as to show only the dorsal surface, each of which is widened and bears a series of transverse cracks as the result of compression (pl. II, fig. 4). It is only in a portion of each length of a few lateral branches that the profiles of thecae are exhibited (pl. II, figs. 5—6). The thecae are tubular, about 3 mm in length and 0.8 mm in width. They overlap about 2/3, with straight apertural margins and straight or slightly concave ventral walls, inclined at about 35° and numbering 6—7 in 10 mm.

A single fragmentary specimen with its counterpart illustrated by Pl. II, figs. 2a—b shows that each of the lateral branches bears a pair of short lateral branchlets. This appears to be another distinct form. Because of the incompleteness of the specimen, it is provisionally placed in the present species.

图 版 說 明

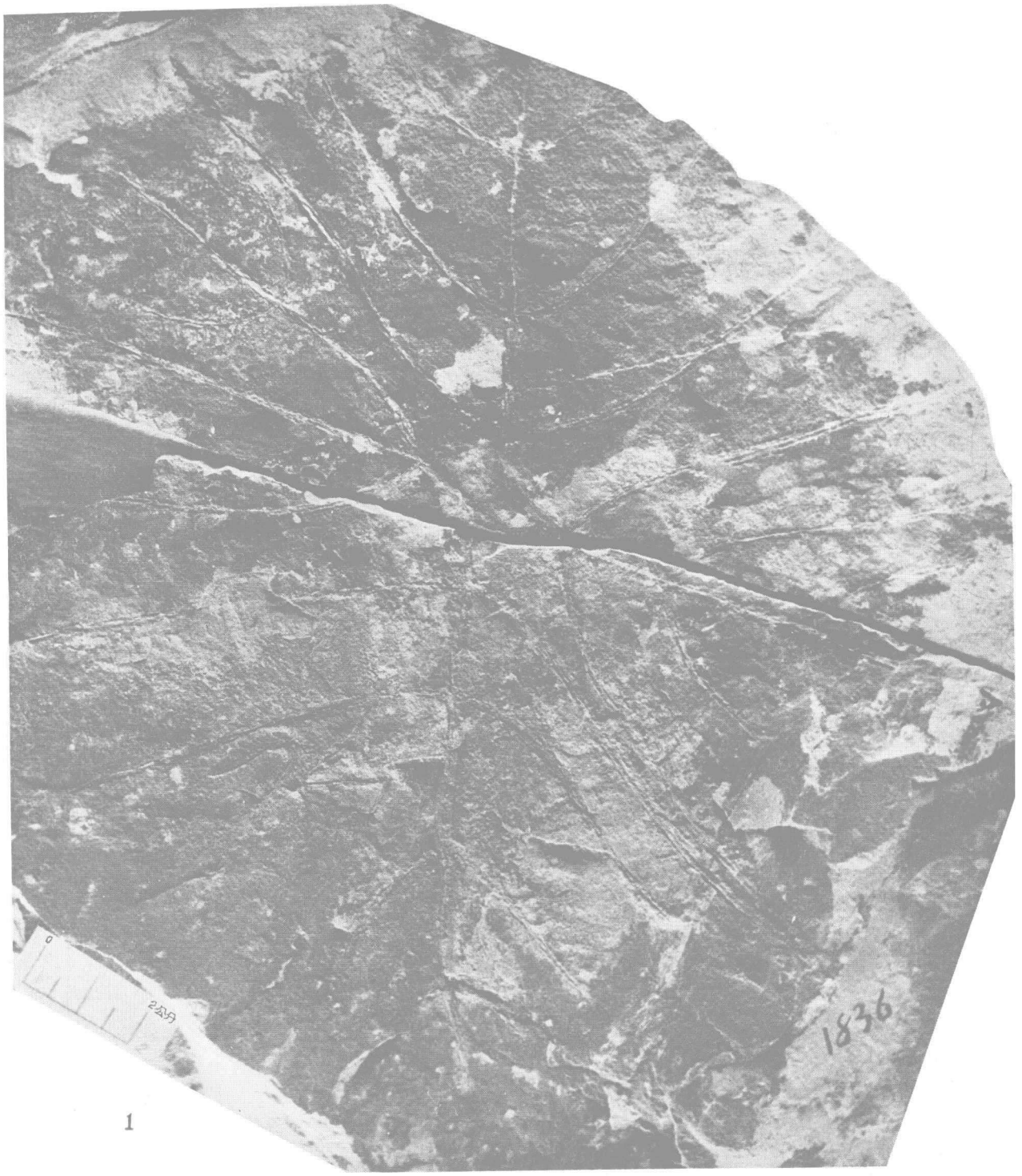
Explanation of Plates

图 版 I

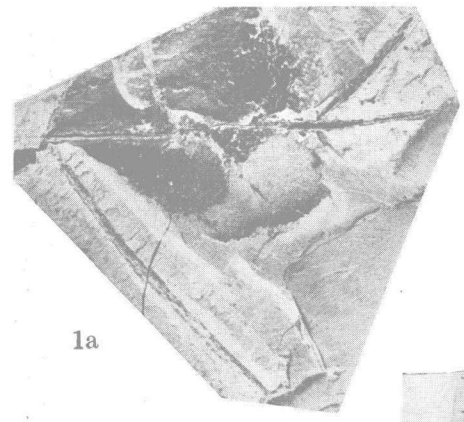
图 1. 浙江三叉笔石(新属,新种)。正型标本,原大(号碼 1836a)

Explanation of plate I

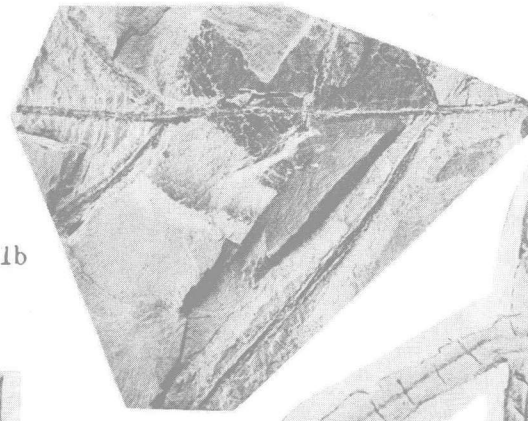
fig. 1. *Tridensigraptus zhejiangensis* gen. et sp. nov. Holotype (No. 1836a), natural size.



1



1a



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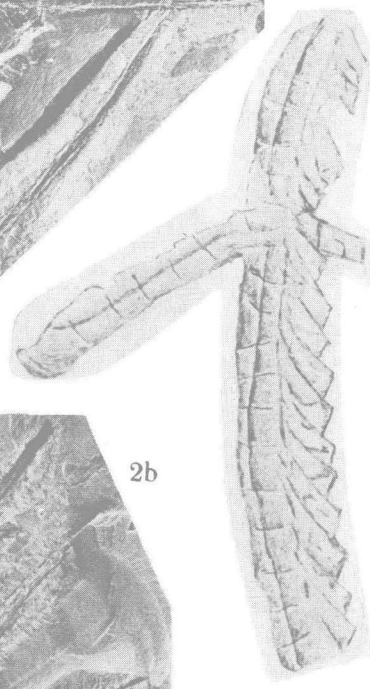

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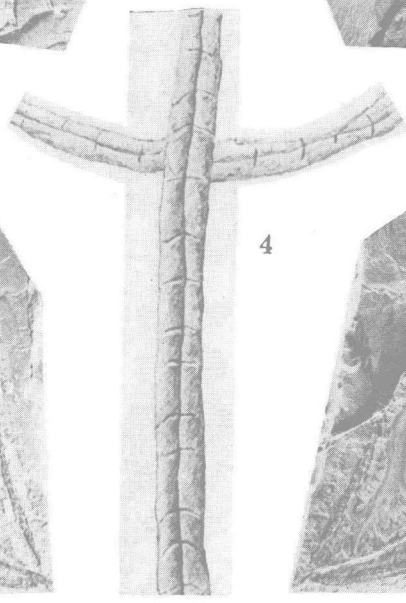

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2a

2b

3

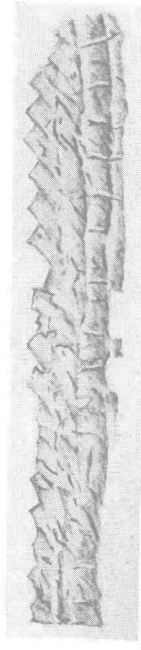

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图　版　II

图 1—6. 浙江三叉笔石(新属,新种)

1a—b. 一个标本及其反对面(号碼 1837 a—b),副型标本,原大。

2a—b. 一个标本及其反对面(号碼 1838 a—b)。一个脫落的主枝带有侧枝,可能为另一个新种,保存不完全,暫列于此。

3. 为图版 I 图 1 反对面的一部分(号碼 1836 b),原大。

4. 为图版 I 图 1 部分放大 4 倍,为背面向上腹面向下之主枝与侧枝,示二者之关系及背部被压后形成之两排长方形格子。

5—6. 5.为图版 II 图 2b 部分放大 4 倍; 6.为图版 I 图 1 部分放大 4 倍。示胞管性状,主枝与侧枝之关系及背部被压后的形状。

Explanation of plate II

Figs. 1—6. *Tridensigraptus zhejiangensis* gen. et sp. nov.

1a—b. Two compressed specimens, one being the counterpart of the other, paratype, natural size (Nos. 1837a—b)

2a—b. A fragmentary specimen with counterpart, natural size (Nos. 1838a—b), probably another distinct form, provisionally placed in the present species.

3. An incomplete counterpart of pl. 1, fig. 1, natural size (No. 1836b).

4. Enlargement (×4) of a portion of Pl. 1, fig. 1, showing the appearance of the dorsal surface of the main stipe.

5. Enlargement (×4) of a portion of Pl. II, fig. 2b, showing profiles of thecae.

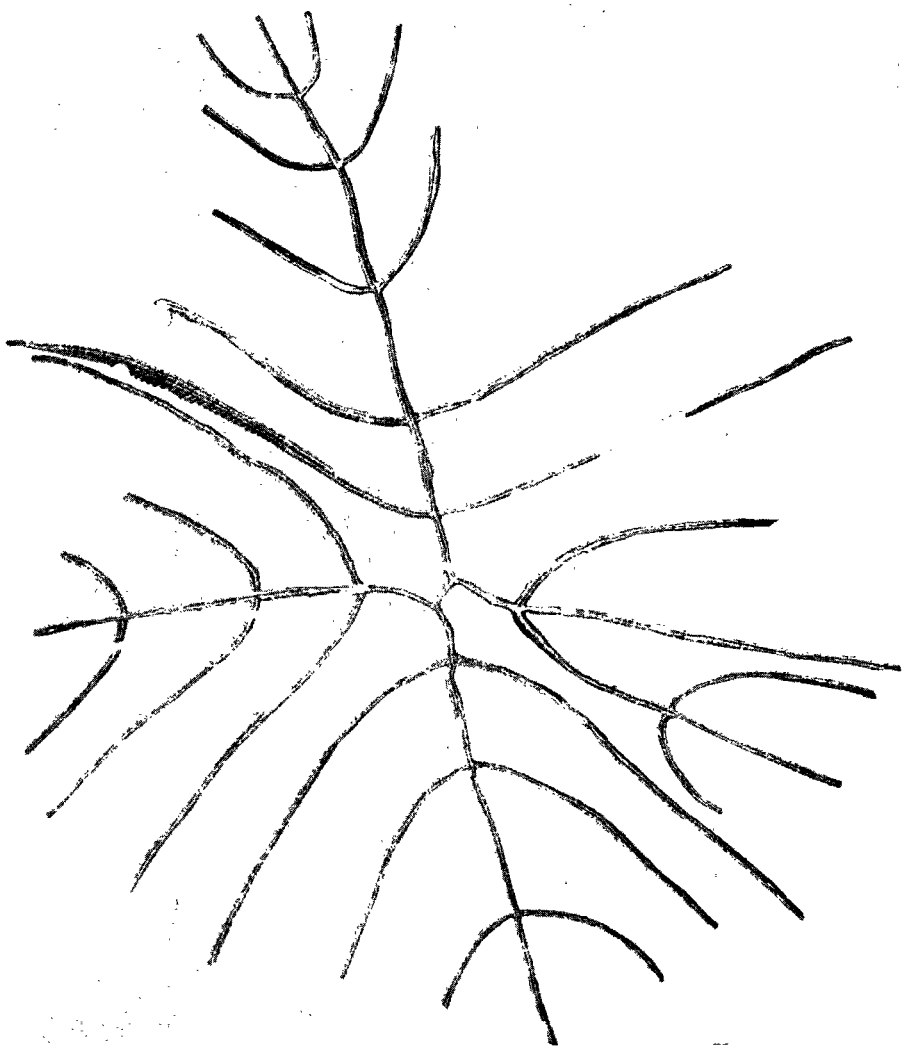
6. Enlargement (×4) of a portion of Pl. 1, fig. 1, showing profiles of thecae.

图　版　III

浙江三叉笔石(新属,新种)
图 1.　(=图版 I 图 1)。正型标本(号碼 1836a)。3/4 倍。
图 2.　(=图版 II 图 2a)(号碼 1838 a)。3/4 倍。
图 3.　(=图版 II 图 1a)(号碼 1837 a),副型标本。3/4 倍。

Explanation of Plate III

Tridensigraptus zhejiangensis gen. et sp. nov.
fig. 1.　(=Pl. I, fig. 1) Holotype (No. 1836a), ×3/4。
fig. 2.　(=Pl. II, fig. 2a) (No. 1838a)。×3/4。
fig. 3.　(=Pl. II, fig. 1a) (No. 1837a)。paratype, ×3/4。



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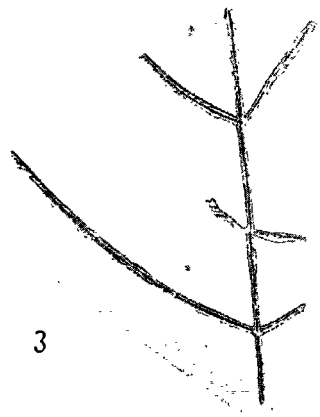
2



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