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娇笔石科的新材料

穆恩之 乔新东
（中国科学院地质古生物研究所） （新疆維吾尔自治区地质局）

最近笔者等整理浙江的笔石标本时，发現一些娇笔石科的笔石，这些笔石經鉴定有下列四种：

1. 中国双綫笔石 *Dinemagraptus sinicus* Mu et Qiao（新种）
2. 美丽娇笔石 *Abrograptus formosus* Mu
3. 三枝拟娇笔石 *Parabrograptus tribrachiatus* Mu et Qiao（新属、新种）
4. 分枝江山笔石 *Jiangshanites ramosus* Mu et Qiao（新属、新种）

这些笔石标本大部分是卢衍豪、穆恩之、侯祐堂、张日东、刘第墉等在浙江江山黄泥崗附近的中奥陶統胡乐頁岩組中所采得的；小部分是葛梅鈺、景延祥、张德明等在浙江龙游志棠附近的胡乐頁岩組中采得的。

娇笔石科系笔者之一（穆恩之）于1958年創立的。这一科的特征是，两枝的无軸笔石，除了胎管以外，其体壁均已退化，形成网綫結构。在創立該科时包括两个属，即双綫笔石（*Dinemagraptus*）和娇笔石（*Abrograptus*）。双綫笔石一属过去仅在波兰有过报导（Kozlowski, 1951），只有一个种，即其属型 *Dinemagraptus warkae* Kozlowski，产于导源于斯堪的納維亚的冰川漂砾中，其时代为阿利尼克（Arenigian）期。中国的新种 *Dienmagraptus sinicus* 則产于卡拉多克（Caradocian）初期的 *Nemagraptus gracilis* 带。娇笔石一属，自从在浙江江山发現以后，又在龙游发現；不仅出現在 *Nemagraptus gracilis* 带，同时在其下的 *Glytpograptus teretiusculus* 带中亦有代表。在国外，瑞典也有娇笔石的报导（Jaanusson, 1960），但未描述。新属拟娇笔石同娇笔石相似，但笔石体的結构更加复杂。与娇笔石相比較，則拟娇笔石多出一个中枝；同时，在第一枝的始部，除有三条放射状的短綫以外，靠近上側又多出一条斜綫。这一新属可能是娇笔石的后裔。新属江山笔石是多枝的无軸笔石，其体壁也已退化。因材料不多，其分类位置尚不能确定，仅就其体壁退化的性質，暫时附于此科中描述。

这些新材料的发現，进一步証明了笔石的体壁退化这一演化趋向，在无軸笔石中，同在有軸笔石中一样，也是相当明显的。这就更証实了这种意見："娇笔石科和細网笔石科代表体壁退化趋向的不同的两支。"（穆恩之，1958）

种 的 描 述

娇笔石科 Abrograptidae Mu, 1958

双綫笔石属 *Dinemagraptus* Kozlowski, 1951

中国双綫笔石（新种） *Dinemagraptus sinicus* Mu et Qiao (sp. nov.)

〔图版I，图1—6〕

此种笔石共有上十个标本，保存在黑色頁岩中，风化后，頁岩呈棕色，笔石为黑色細微的网綫。

笔石体微小，两枝向上斜伸，枝长 5—6 毫米。 两枝先向两側近于平伸，很快向上轉，交成 100° 左右的軸角，然后两枝向上，近于平行。由于枝綫极細易曲，有的标本两枝甚至互相交叉。

胎管細小，体壁正常，为长錐形，高 0.55 毫米(不計胎管刺)，寬 0.15 毫米；尖端收縮，延伸为极細的綫管，綫管的保存长度近 1 毫米；胎管刺显著，比較坚硬，微向外弯。

笔石枝的体壁退化，仅有一条縱綫和若干口环，第一枝的枝綫从胎管刺的上部伸出，可能由于此一枝綫的牵扯，使胎管刺向外弯曲；第二枝的枝綫从对面胎管口緣伸出，其位置比第一枝綫略高。两条枝綫先向外伸，而后向上，形成笔石体的圓形始端。胞管口綫作环形，口綫极細，仅在与枝綫相連处較寬，但最大寬度仍不及枝綫的寬度。由于口环极其微細，保存完整的很少，許多口环仅保存与枝綫相連接处的少許，其形如刺，口环直径为 0.3 毫米，相邻口环間的距离为 0.9—1 毫米。在 5 毫米的长度內有 4—5 个胞管。

比較：从外形上看，此种笔石和双綫笔石的属型 *Dinemagraptus warkae* Kozlowski 相似，但是，此一新种的笔石体較大，枝綫較长，口环綫較細，口环的排列也較密；胎管較小，胎管刺向外弯曲。 当娇笔石仅保存一条腹綫时，也和此种笔石相似，但娇笔石的枝綫更細，胎管較寬大，易于区别。

产地及层位：浙江江山黃泥崗新路亭附近；中奥陶統，胡乐頁岩組的 *Nemagraptus gracilis* 带。野外号碼：CB2；登記号碼：13215(正型标本)，13216—13224 (副型标本)。

娇笔石属 *Abrograptus* Mu, 1958

美丽娇笔石 *Abrograptus formosus* Mu

(图版 I，图 7—14)

1958, *Abrograptus formosus*, 穆恩之，古生物学报，6 卷，3 期，261 頁，图版 I，图 1—12；插图 1。

此种笔石的标本很多，同过去描述过的标本相比，其基本性質相同。 新材料显示，此种笔石的笔石枝可以长达 7 毫米。由于枝綫纖細易曲，两个枝間的分散角度亦常变动，腹綫与背綫間的距离无定。 胞管口綫多呈半环形，在同一枝上，相邻口环間的距离，由始端向末端有逐漸縮減之势。一般是 1.4—0.8 毫米。这种情况可能是由于胞管間的掩盖部分向末端逐漸增多，致使相邻胞管口間的距离逐漸縮小。

产地及层位：浙江江山黃泥崗及龙游志棠；中奥陶統，胡乐頁岩組的 *Glyptograptus teretiusculus* 带及 *Nemagraptus gracilis* 带。野外号碼：CB2, GF96, GF97, GF98, GF99a；登記号碼：13225—13228, 13230—13232 (区型标本)；13229, 13233—13235 (近型标本)。

拟娇笔石属(新属)

Parabrograptus Mu et Qiao (gen. et sp. nov.)

特征：似娇笔石，但具有中枝，横管部分多出一条斜綫，口綫呈明显的环形。

属型：*Parabrograptus tribrachiatus* Mu et Qiao (新属、新种)，浙江；中奥陶統，胡乐頁岩組。

三枝拟娇笔石(新属、新种)

Parabrograptus tribrachiatus Mu et Qiao (gen. et sp. nov.)

(图版 II, 图 1—8)

此种笔石有十多个标本,但保存完整的不多,有些仅保存笔石体的始部,也可能是幼年标本。

两主枝向上斜伸,有时近于平行。主枝长 8.5 毫米,每一主枝的两条纵綫(即腹綫和背綫)常常曲折,二綫間的寬度常变,一般为 0.5 毫米,但在胞管口环处則常收縮,二主枝与中枝造成"山"字形或錨状的笔石体。

胎管清楚,具有正常体壁,呈长錐形,高 0.72 毫米,寬 0.18 毫米,胎管刺清楚。第一枝的腹綫生于胎管口緣之下,胎管刺的上部。第二枝的腹綫生于对面略高的位置,两主枝的腹綫先向外伸,很快向上轉,形成笔石体的渾圓始端。在第一枝的始部除了同娇笔石一样具有三条放射状的短綫以外,在靠近背側又多出一条斜綫;此一斜綫的一端与第一枝的背綫相連,另一端則連接胎管的側壁,或者横过胎管;胎管的口綫作不規則的环形,有些口环非常清楚,联于枝的腹綫与背綫之間。口环的一边平整,一边突出,直径一般在 0.55 毫米左右。5 毫米中有 5 个胞管口环。

从第一主枝始部的背側,即横管的位置向上生出一条中枝。中枝直立向上,其长度与主枝相当,因而造成"山"字形或錨状的笔石体。中枝的一条纵綫从第一枝的背綫始部生出,另一纵綫与綫管合而为一,看起来象是綫管本身形成了中枝的一条纵綫。中枝的两条纵綫亦常曲折,但仍大致平行。在中枝上有时可以看到胞管口綫,形如横耙,尚未見到口环构造。

比較: 此种笔石很象娇笔石,尤其当标本不完整时,更易于和娇笔石相混。但此种笔石具有中枝,始部多出一条斜綫,可以区别。从多出一个中枝和一条斜綫等特征看来,可能表示此种笔石已达到較高的发育阶段。多出一条斜綫可能表示增多一个横管,已达到了变相的等称笔石式或紆笔石式的发育阶段;多出一条中枝也表示此笔石已达到可能与紆笔石科的笔石相当的阶段,因为过去仅在紆笔石科中見到中枝。从地层层位上看,娇笔石在兰代洛 (Llandeilian) 期已出現,而此种笔石則出現在卡拉多克初期。很可能此种笔石系从娇笔石演变来的。

产地及层位: 浙江江山黃泥崗村后;中奥陶統,胡乐頁岩組的 *Nemagraptus gracilis* 带。野外号碼: CB38; 登記号碼: 13236 (正型标本), 13237—13245 (副型标本)。

江山笔石属(新属) *Jiangshanites* Mu et Qiao (gen. nov.)

特征: 笔石体的完整形状不明,具有一个正常的胎管,一个(也可能两个)主枝,水平伸出,具有側枝,胞管体壁退化,主枝及側枝仅存一条枝綫及若干口綫。

属型: *Jiangshanites ramosus* Mu et Qiao (新属、新种),浙江江山;中奥陶統,胡乐頁岩組。

分枝江山笔石(新属、新种)

Jiangshanites ramosus Mu et Qiao (gen. et sp. nov.)

(图版 II, 图 9—14)

此种笔石的标本很多，未見完整的笔石体，枝綫保存的最大长度在 30 毫米左右。胎管細长，全部碳化，高 1.33 毫米(不計胎管刺)，寬 0.15 毫米，为长錐形，两側近于平行，未見綫管，具有口刺及胎管刺，胎管刺向外弯曲。第一枝綫出生于胎管刺的中上部，向外平伸，可能由于此一枝綫的影响，胎管刺在与枝綫的交接处向外弯曲，所見二个胎管标本，均見第一枝的枝綫，而未見第二枝的枝綫。胞管体壁退化，主枝及側枝仅存一条枝綫及若干口綫，这些枝綫有愈向末端愈趋纤細的現象。从腹側生出側枝，側枝与主枝大致垂直，其性質与主枝相同。

胞管口綫极其纤細，呈弱刺状，长約 0.44 米，基部粗，很快变細，有时見到两个口綫，形同双刺，可能是口环由于外側过細易于断裂所致，但迄今未見有环形构造。相邻口环的距离，一般在 1.2—1.4 毫米至 3—4 毫米之間。

比較：此种笔石的枝綫极細，外形很象鞭笔石 (*Mastigograptus* Ruedemann, 1908, p. 210)，但后者具有錐形胞管，胞管体壁正常，而此种笔石則无任何胞管保存，差别很大。从枝綫及口綫的性質来看，此种笔石又比較接近双綫笔石，但因具有側枝，而与后者差别相当明显。值得注意的是，此种笔石的胎管全部碳化，在风化成为粉紅色的頁岩上呈深黑色，与双綫笔石、娇笔石以及拟娇笔石的胎管为棕色者有所不同。因此，在获得較完整的标本以前，此种笔石的分类系統位置尙不能确定。

产地及层位：浙江江山黃泥崗新路亭附近；中奥陶統，胡乐頁岩組的 *Nemagraptus gracilis* 带。野外号碼：CB2；登記号碼：13246—13255 (共型标本)。

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NEW MATERIALS OF ABROGRAPTIDAE

A. T. Mu

(*Institute of Geology & Palaeontology, Academia Sinica*)

X. D. Qiao

(*Geological Bureau of Xinjiang*)

Recently while investigating the Ordovician graptolites of Zhejiang (Chekiang), the writers found a number of specimens of the family Abrograptidae among the collections of graptolites deposited in this Institute. Four species belonging to four genera are recognized as follows:

1. *Dinemagraptus sinicus* sp. nov.
2. *Abrograptus formosus* Mu

3. *Parabrograptus tribrachiatus* gen. et sp. nov.
4. *Jiangshanites ramosus* gen. et sp. nov.

These graptolite specimens were mainly collected by Prof. Y. H. Lu, Miss Y. T. Hou, Mr. J. T. Chang, Mr. T. Y. Liu and one of the writers (Mu) from the Middle Ordovician Hulo shale of the Jiangshan (Kiangshan) district, western Zhejiang in 1954 and partly by Mr. M. Y. Geh and others from the Hulo shale of Longyou, Zhejiang in 1958.

The family Abrograptidae was established by the senior writer in 1958. It consists of two genera known as *Dinemagraptus* Kozlowski and *Abrograptus* Mu. Both of them are monotypic. The genus *Dinemagraptus* formerly was only known in Poland (Kozlowski, 1951). The type species *Dinemagraptus warkae* Kozlowski was found from erratic limestone boulders of Scandinavian origin. It is considered to be Arenigian in age. Now a new species of this genus, *Dinemagraptus sinicus* sp. nov., is discovered from the early Caradocian *Nemagraptus gracilis* zone in China in association with *Abrograptus*. The genus *Abrograptus* is first discovered from the *Nemagraptus gracilis* zone of Jiangshan, and now it occurs in both the zone of *Nemagraptus gracilis* and the underlying zone, the zone of *Glyptograptus teretiusculus*, of Longyou. Abroad, an unnamed species of *Abrograptus* was recently listed by Jaanusson (1960) from Sweden. The new genus *Parabrograptus* resembles *Abrograptus* in main characters, but has a central branch and an oblique filament in addition to the three radiated filaments in the proximal portion of the first main stipe. It is most probably a derivative of *Abrograptus*. The new genus *Jiangshanites* is a multiramous graptolite with thecal periderm reduced. Its systematic position is still uncertain due to its fragmentary preservation. On account of the peculiar character of the reduced periderm, this genus is here provisionally described under the family Abrograptidae.

The occurrence of these new materials of the family Abrograptidae reveals that the reduction of the periderm is also notable in the axonolipous graptoloids as in the axonophorous graptoloids. It further confirms the opinion that "the family Abrograptidae and the family Retiolitidae represent two different lines of the reduction of the thecal periderm in Graptoloidea." (Mu, 1958, p. 264)

DESCRIPTION OF SPECIES

Family Abrograptidae Mu, 1958

Genus *Dinemagraptus* Kozlowski, 1951

Dinemagraptus sinicus sp. nov.

(Pl. I, figs. 1—6)

This species is represented by some ten specimens. The specimen 13215 (Pl. I, fig. 1) is selected as the holotype. The rhabdosome is very small. It consists of two reclined stipes, about 5—6 mm in length, diverging at an angle of 260°. The sicula is slender with normal periderm, measuring 0.55 mm in height (exclusive of virgella) and 0.15 mm in width. It is pointed at its apex, provided with a very fine nema which is nearly 1 mm in length. The virgella is distinct, stiff, and slightly curved outward.

The thecal periderm is reduced. Each of the two stipes is composed of merely one longitudinal filament and several apertural rings. The longitudinal filament of the first stipe originates from the upper portion of the virgella, whereas that of the second stipe originates from the opposite side of the sicula, slightly higher than the former in pisition. These two stipe filaments grow first horizontally and then upwards, forming thus a rounded base of rhabdosome.

The filaments of the apertural rings are extremely thin and usually broken. Only a few rings are preserved, about 0.3 mm in diameter. The intervals between the apertural rings are in general 0.9—1 mm in length. There are 4—5 thecae in 5 mm.

Comparison: In general aspect, this species closely resembles the genotype, *Dinemagraptus warkae* Kozlowski, but differs therefrom in the smaller sicula and longer longitudinal filaments of the stipes. Furthermore, the apertural rings in the present species are more closely set in a given unit of length. From an incomplete specimen of *Abrograptus formosus* Mu which it resembles, this form may be distinguished by its smaller sicula and courser filaments.

Horizon and Locality: This new species occurs in the *Nemagraptus gracilis* zone of the Hulo shale of Jiangshan, W. Zhejiang. Field No. CB2; Cat. Nos. 13215 (holotype), 13216—13224 (paratypes).

Genus *Abrograptus* Mu, 1958

Abrograptus formosus Mu

(Pl. I, figs. 7—14)

1958. *Abrograptus formosus*, Mu. Acta Palaeontologica Sinica, vol. 6, No. 3, p. 265, pl. 1, figs. 1—12; text-fig. 1.

Numerous specimens of this species were found. The new materials are fully agreeable in the main characters with the type specimens described and figured by the senior writer in 1958. In the recent specimens, the stipes are longer, measuring about 7 mm in length. The longitudinal filaments of the stipes are very delicate and are usually distorted. The apertural filaments of the thecae are preserved in half rings or "cross-bars". The intervals between the apertural rings become shorter and shorter distally, from 1.4 mm in the proximal portion of the stipes to 0.8 mm in the distal. This character possibly indicates the increase of the thecal overlap towards the distal end of the stipes.

Horizon and Locality: This species occurs in the *Glyptograptus teretisculus* zone and the *Nemagraptus gracilis* zone of the Hulo shale of Jiangshan and Longyou, W. Zhejiang. Field Nos. CB2, GF96, GF97, GF98, GF99, GF99a. Cat. Nos. 13225—13228, 13230—13232 (topotypes); 13229, 13233—13235 (plesiotypes).

Genus *Parabrograptus* gen. nov.

Diagnosis: Like *Abrograptus*, but comprising a central branch and an oblique filament in the crossing canal region in addition to the three radiated filaments. Apertural filaments forming distinct rings.

Genotype: *Parabrograptus tribrachiatus* gen. et sp. nov., Middle Ordovician, Zhejiang.

Parabrograptus tribrachiatus gen. et sp. nov.

(Pl. II, figs. 1—8)

This species is represented by more than ten specimens of which most are incomplete in preservation. The specimen 13236 (Pl. II, fig. 1) is the holotype. In a few specimens only the proximal portion of rhabdosome is preserved. They are either incomplete or young forms.

The two main stipes grow first outward and then upwards, parallel to one another for a great part. These two stipes together with the central branch constitute an "E" shaped or anchor-like rhabdosome. The stipes are 8.5 mm long and 0.5 mm wide. The longitudinal filaments of the

stipes are usually flexuous, thus, the width of the stipes is variable.

The sicula is normal, longiconic in shape, measuring 0.72 mm high and 0.18 mm wide. The virgella is short but distinct. The ventral filament of the first main stipe originates from the upper part of the virgella just below the apertural margin of the sicula, and that of the second stipe originates from the opposite side slightly higher in position. These two longitudinal filaments diverge from the sicula firstly outward and then upwards, forming thus a rounded base of the rhabdosome. In the proximal portion of the first stipe, there is a short oblique filament in addition to the three short radiated filaments. This oblique filament is connected with the dorsal filament of the first stipe and with the sicula, and occasionally it runs across sicula. The apertural filaments of the thecae constitute irregular rings which connect the two longitudinal filaments of stipe. The rings are elliptical in form due to compression. It appears that one side of them is flat and the other side is strongly arched. They are 0.55 mm in diameter, numbering 5 in 5 mm.

Like the main stipes, the central branch consists of two longitudinal filaments and apertural filaments. But the apertural filaments in the central branch are poorly preserved as "cross-bars" between the two longitudinal filaments. No apertural rings are observed. One of the two longitudinal filaments of the central branch originates from the proximal part of the dorsal filament of the first main stipe, and the other is entirely incorporated with the nema. It seems to be the nema itself to form one of the two longitudinal filaments of the central branch.

Comparison: This form closely resembles *Abrograptus formosus* Mu in spite of the presence of a central branch and an additional oblique filament. The presence of a central branch and an additional filament possibly reveals that this form reaches a higher stage of development. The presence of an additional oblique filament in the crossing canal region indicates probably the presence of a second crossing canal as in the stage of Isograptid type or the Leptograptid type of development. The presence of a central branch is a peculiar character of Leptograptidae. Stratigraphically, this form occurs in the zone of *Nemagraptus gracilis* of early Caradocian, whereas *Abrograptus* makes its first appearance in the *Glyptograptus teretiusculus* zone of Llandeilian. It is most probable that the new genus *Parabrograptus* is derived from *Abrograptus*.

Horizon and Locality: This new form occurs in the *Nemagraptus gracilis* zone of the Hulo shale of Jiangshan. Field No. CB38; Cat. Nos. 13236 (holotype), 13237—13245 (paratypes).

Genus *Jiangshanites* gen. nov.

Diagnosis: The complete form of rhabdosome is unknown. The sicula is normal, with one (possibly two) horizontal main stipe and lateral branches; the thecal periderm is reduced. Both the main and lateral stipes are composed of one longitudinal filament and several apertural filaments.

Genotype: *Jiangshanites ramosus* gen. et sp. nov., Middle Ordovician, Zhejiang.

Jiangshanites ramosus gen. et sp. nov.

(Pl. II, figs. 9—14)

This form is represented by many specimens, but no complete rhabdosome is obtained. The longest fragmentary specimen observed is more than 30 mm in length.

The sicula is cylindrical in shape, measuring 1.33 mm in height and 0.15 mm in breadth. The sicular periderm is normal but is highly carbonized. The virgella is strongly curved outward, and an apertural spine of sicula is well developed.

The thecal periderm is reduced. Both the main and lateral stipes are composed of one longitudinal filament and several apertural filaments. The longitudinal filament of the first stipe originates from the upper part of the virgella, growing horizontally and branching laterally from the ventral side at arregular intervals. The lateral branches are nearly perpendicular to the main stipe. Both of them become gradually thinner towards the distal end The apertural filaments are extremely thin, about 0.44 mm in length. They are occasionally paired. due to probably the breaking of the apertural rings. But no apertural rings are observed. The intervals between the apertural filaments become shorter gradually towards the distal end and range from 3—4 mm to 1.2—1.4 mm in general.

Comparison: In the thread-like stipes, this form bears some resemblance to a species of *Mastigograptus* (Ruedemann, 1908, p. 210), but differs strikingly in the character of thecae. The thecae of the latter genus is conic in form with normal periderm. It is noteworthy that the sicula of this form is highly carbonized and unlike that in the other genera of Abrograptidae. The systematic position of this form is uncertain, until more complete specimens are available.

Horizon and Locality: This form occurs in the *Nemagraptus gracilis* zone of the Hulo shale of Jiangshan, Zhejiang. Field No. CB2; Cat.Nos. 13246—13255 (syntypes).

图 版 說 明

本文所描述的标本，全部保存在中国科学院地質古生物研究所。所有图象均系笔者用拉普遲斯显微鏡繪制，并由张务聪先生清繪。

图 版 I

1—6. *Dinemagraptus sinicus* sp. nov.

1. 比較完整的笔石体，正型标本 (Holotype)。注意綫管及口环。浙江江山县黄泥崗村前新路亭附近；胡乐頁岩組，*Nemagraptus gracilis* 带。野外号碼：CB 2；登記号碼：13215。

2—6. 副型标本 (Paratype) 枝綫多已变动，注意口环及残留的口綫。产地及层位同上。野外号碼：CB2；登記号碼：13216—13220。

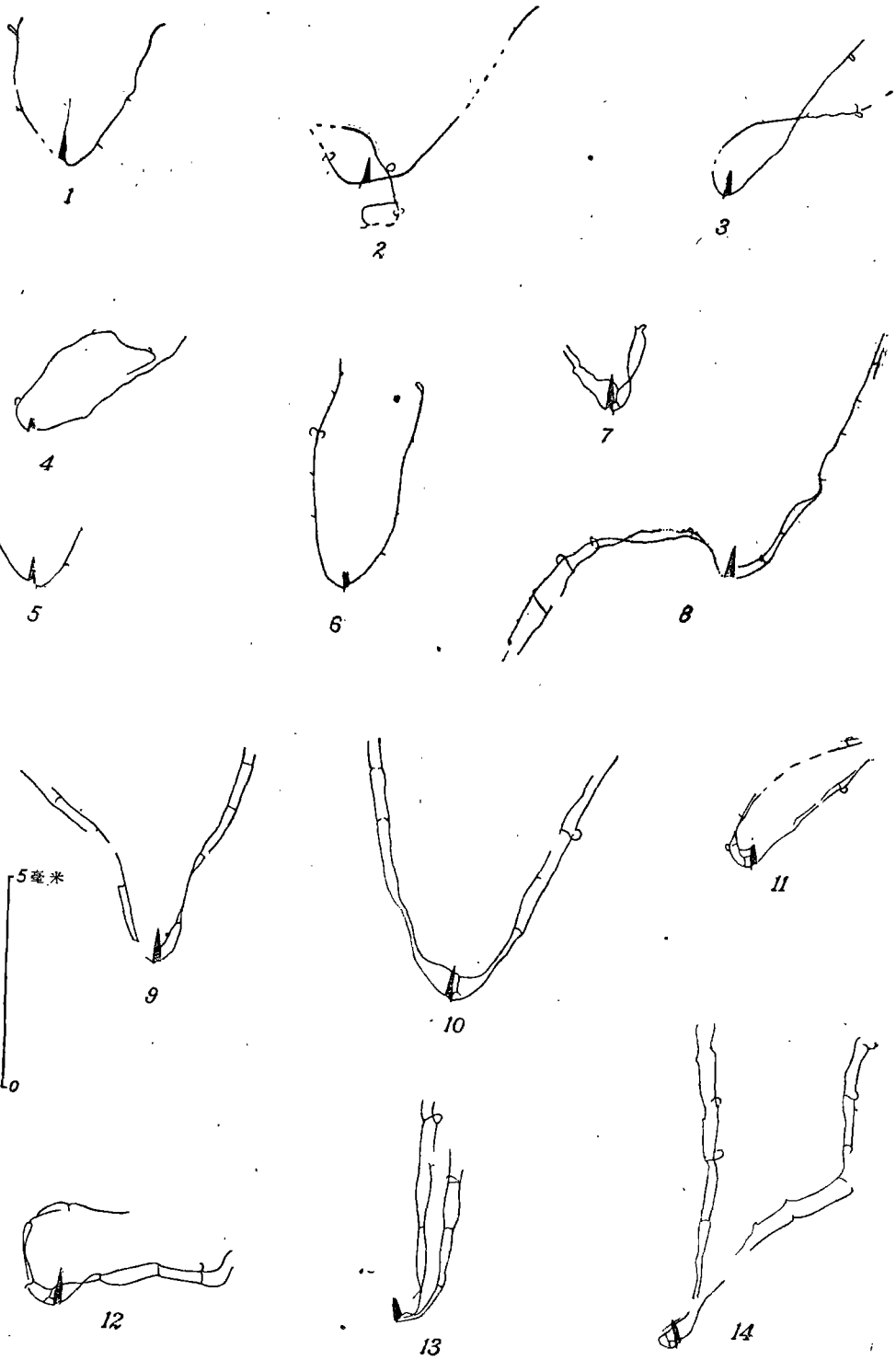
7—14. *Abrograptus formosus* Mu

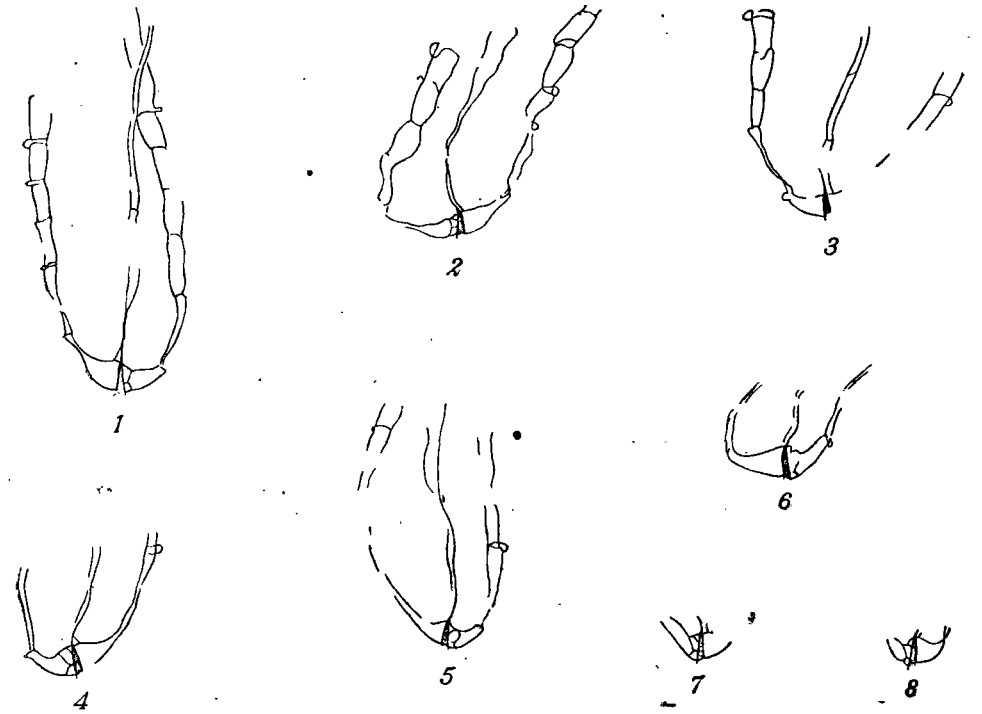
7—9. 不甚完整的标本，区型标本 (Topotypes)。产地及层位同前一种。野外号碼：CB 2；登記号碼：13226—13228。

10. 比較完整的笔石体，近型标本 (Plesiotype)。注意三条放射綫与口环。浙江龙游县志棠附近；胡乐頁岩組底部，*Glyptograptus teretiusculus* 带。野外号碼：GF 99；登記号碼：13229。

11—13. 区型标本。枝綫已变动，部分口环尙清楚。浙江江山黄泥崗新路亭；胡乐頁岩組，*Nemagraptus gracilis* 带。野外号碼：CB 2；登記号碼：13230—13232。

14. 近型标本。浙江龙游志棠；胡乐頁岩組底部，*Glyptograptus teretiusculus* 带。野外号碼：GF 99a；登記号碼：13233。





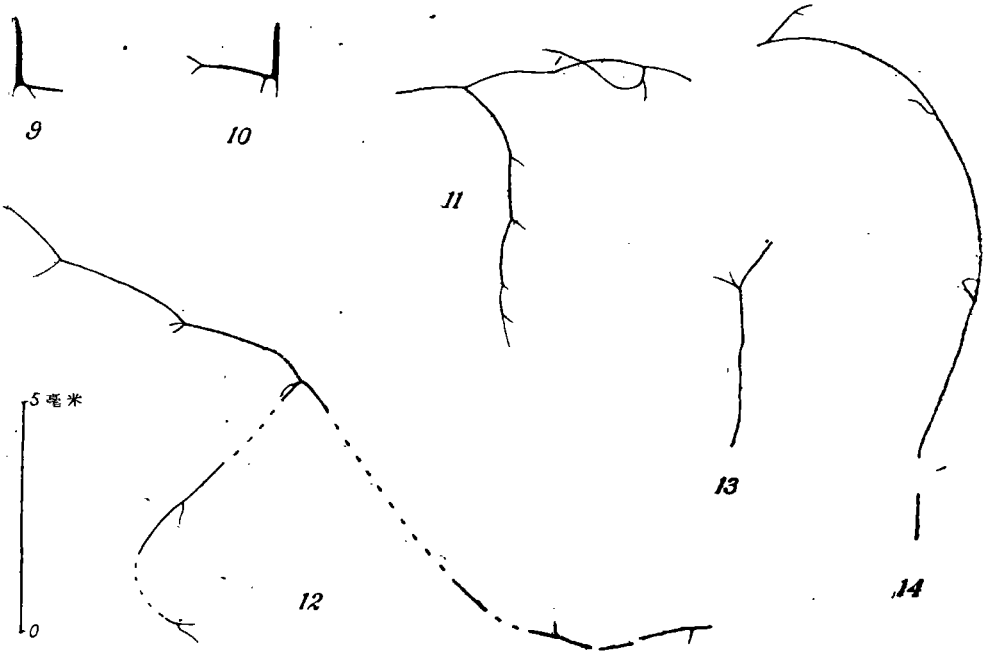


图 版 II

1—8. *Parabrograptus tribrachiatus* gen. et sp. nov.

1. 比較完整的标本，正型标本 (Holotype)。浙江江山黃泥崗村后；胡乐頁岩組，*Nemagraptus gracilis* 帶。野外号碼：CB38；登記号碼：13236。

2—6. 副型标本 (Paratypes)。注意中枝及口环。产地及层位同上。野外号碼：CB38；登記号碼：13237—13241。

7—8. 两个不完整的标本，笔石体的始部或幼年标本，副型标本。注意三条放射綫和另一斜綫。产地及层位同上。野外号碼：CB38；登記号碼：13242—13243。

9—14. *Jiangshanites ramosus* gen. et sp. nov.

9—10. 两个不完整的标本或幼年标本，共型标本 (Syntypes)。仅有胎管及一个胞管，注意胎管刺及胎管的口刺。浙江江山黃泥崗新路亭；胡乐頁岩組，*Nemagraptus gracilis* 帶。野外号碼：CB2；登記号碼：13246—13247。

11—14. 不完整的标本，仅有枝綫。共型标本。注意枝綫的分枝及口綫。产地及层位同上。野外号碼：CB2；登記号碼：13248—13251。