

論 螺 旋 筆 石*

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筆者於1948年討論單筆石科(Monograptidae)的分類時,認為單筆石(*Monograptus*)一屬的範圍過於廣泛,有進一步分類的必要。捷克和德國的古生物工作者已經將單筆石一屬分作若干科包括許多屬。可是這些科和屬尚未得到許多古生物學家的承認。其中耙筆石(*Rastrites*)一屬是大家所公認的,有的將它當作單筆石的亞屬,有的將它當作獨立的一屬。耙筆石僅僅代表單筆石科中胞管(theca)發展的幾個主要趨向之一,即胞管的孤立。同樣,代表其他幾個趨向的屬,也應當被採用。因此,筆者贊同尹贊勳教授對單筆石科的分類,將單筆石科分作兩個亞科,即單筆石亞科(Monograptinae)和弓筆石亞科(Cyrtograptinae)。單筆石亞科,包括下面六個屬:

單筆石亞科 筆石體上攀生長,或直或曲,胞管單列,僅有一個簡單的筆石枝。

1. 單筆石(狹義的) 單筆石亞科中的筆石,其成年胞管向後彎曲,呈鈎狀。屬型:*Lomatoceras priodon* Bronn.

2. 鋸筆石(*Pristiograptus*) 單筆石亞科中的筆石,其成年胞管為簡單的直管狀。屬型:*Pristiograptus frequens* Jackel.

3. 捲筆石(*Streptograptus*) 單筆石亞科中的筆石,其成年胞管向外捲曲,呈球形。屬型:*Monograptus nodifer* Törnquist.

4. 單柵筆石(*Monoclimacis*) 單筆石亞科中的筆石,其成年胞管腹緣凹入,口部向內轉,形成顯著的方形口穴。屬型:*Graptolithus vomerinus* Nicholson.

5. 半耙筆石(*Demirastrites*) 單筆石亞科中的筆石,其成年胞管向外伸展,呈三角形,常具有彎曲的口端。屬型:*Graptolithus triangulatus* Harkness.

6. 耙筆石(*Rastrites*) 單筆石科中的筆石,其成年胞管孤立而直,形狀似耙。屬型:*Rastrites peregrinus* Barrande.

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至於螺旋筆石 (*Spirograptus*), 其屬型 *Graptolithus turriculatus* Barrande 的胞管爲彎鉤狀, 屬於單筆石 *Monograptus sedgwickii* 式。因此, 筆者當時將螺旋筆石當作狹義單筆石的同義名稱 (Synonym) 之一。

起初, Gürich 於 1908 年創立螺旋筆石一屬名時, 係根據兩種筆石, 即 *Graptolithus turriculatus* Barrande 和 *Monograptus subconicus* Törnquist。後一種是 *Graptolithus spiralis* Geinitz 的同義名稱。後來, Bulman 於 1929 年指定 *Graptolithus turriculatus* Barrande 作爲螺旋筆石的屬型, 並將螺旋筆石列爲單筆石的同義名稱之一。

尹贊勳教授於 1937 年曾經用過螺旋筆石一名, 但在他以後的著作中, 已不再採用。

1944 年捷克的古生物學家 Pribyl 詳細地描述螺旋筆石, 重釐定義。並將螺旋筆石分作兩組, 即 "*Spirograptus*" *spiralis* 組和 "*Spirograptus*" *communis* 組。他將 *Graptolithus spiralis* Geinitz 當作前一組的標準種, 而將螺旋筆石的屬型 *Graptolithus turriculatus* Barrande 列在該組的最後。

雖然 Pribyl 承認 *Graptolithus turriculatus* Barrande 是螺旋筆石的屬型, 但是, 事實上在他的觀念中 *Graptolithus spiralis* Geinitz 已經代替了 *Graptolithus turriculatus* Barrande 的屬型地位。他給螺旋筆石所下的定義也僅僅以 *Graptolithus spiralis* Geinitz 爲根據, 而與屬型 *Graptolithus turriculatus* Barrande 的性質反不相同。當他描述 *spiralis* 時, 極盡其詳, 並且引用 Bulman 的插圖來證明螺旋筆石的胞管和單筆石的胞管不同, 而不用屬型 *turriculatus* 的胞管性質來作比較。雖然 *turriculatus* 和 *spiralis* 兩種筆石同樣被許多古生物學家描述過, 可是當他描述螺旋筆石的屬型 *turriculatus* 時, 却說這一種已經由 Barrande, Perner, Elles 及 Wood 等詳細描述過, 沒有再詳細描述的必要了。

既然如此, 就讓我們回轉到 Elles 及 Wood 的著作, 看看她們對 *Graptolithus turriculatus* Barrande 的見解是怎樣的。由於 *turriculatus* 的胞管是彎曲的, Elles 及 Wood 將它放在 *Monograptus priodon* (Bronn) 組裏, *Monograptus priodon* (Bronn) 是單筆石的屬型。她們指出 *turriculatus* 的胞管是屬於 *Monograptus sedgwickii* 式的, 並且還用一些插圖來證明此種胞管的性質 (見 Elles & Wood, 1912, 438 頁, 插圖 301 a-c), 這些插圖也是 Pribyl 所承認的 (見 Pribyl, 1944, 27 頁), 根據這種性質, 筆者在 1948 年認爲 *turriculatus* 可以包括在狹義的單筆石屬

裏。螺旋筆石的屬型既然成爲單筆石的一種，自然螺旋筆石便成爲單筆石的同義名稱，這是非常明顯的。

Pribyl 不顧這些事實，最近依然強調螺旋筆石的性質，不僅是旋轉的筆石體，更重要的是三角形的胞管，並且在胞管口端具有一個小的蓋狀構造，即所謂“Scepellum” (Pribyl, 1952, 16頁)，這種性質和 *Graptolithus spiralis* Geinitz 是完全符合的，但是和螺旋筆石的屬型 *Graptolithus turriculatus* Barrande 的性質不相符合，不能認爲是螺旋筆石的性質。相反的，三角形的胞管具有所謂“Scepellum”，正是“半耙筆石亞科”（半耙筆石）的特性，這是 Pribyl 自己所下過的定義 (Pribyl, 1946, 283 頁)。所以，*Graptolithus spiralis* Geinitz 應當是半耙筆石的一種。這一種筆石和標準的半耙筆石（狹義的）的區別，也僅在於始末胞管形狀的一致。標準的半耙筆石，筆石體的始部胞管爲孤立狀，如同耙筆石的胞管。筆者認爲，這種差別至多祇能當作亞屬的性質。

這是很清楚的，所謂螺旋筆石的兩個最標準的種 *turriculatus* 和 *spiralis*，分別屬於兩個不同的屬，它們的胞管性質全不相同，僅僅旋轉的筆石體是相似的。但是，筆石體的旋轉彎曲並不能視作屬的性質，因爲很多不同屬的筆石，其筆石體是旋轉彎曲的。因此，將一些具有旋轉筆石體的筆石放在一個屬裏，而不考慮它們的胞管性質，是非常不妥當的。胞管的性質必須當作屬的主要性質之一來看待，正像雙筆石科 (Diplograptidae) 和兩形筆石科 (Dimorphograptidae) 中的筆石一樣。

此外，Pribyl 還將 *Monograptus changyangensis* Sun 當作螺旋筆石的一種。筆者實在找不出這種筆石和螺旋筆石的屬型 *Graptolithus turriculatus* Barrande 之間有任何相同之點，除非這種筆石的筆石體也是彎曲的。孫雲鑄教授在創立這種筆石時，曾經明白地說過，這種筆石的胞管細長，胞管的口緣短，具有尖銳的口尖；胞管的腹緣差不多是直的（見孫雲鑄，1933，43 頁）。這種筆石的胞管顯然是屬於簡單的直管式。所以在“中國標準化石”稿中，孫雲鑄教授、許傑教授同筆者將此種筆石放在 *Monograptus (Pristiograptus)* 之下。在同一稿中，*Monograptus turriculatus* (Barrande) 及 *Demirastrites spiralis* (Geinitz) 分別被置於 *Monograptus (Monograptus)* 及 *Monograptus (Demirastrites)* 之下。

最近，蘇聯古生物學家 Обыт 也看出 *turriculatus* 和 *spiralis* 二者之間的不同性質，並將這兩種筆石分開屬於兩個屬。不幸的是，他將 *spiralis* 當作螺旋筆石的屬型，而用 *turriculatus* 作屬型另行創立一個新屬，叫做塔筆石 (*Tyrsograptus*)。

如果這兩種筆石可以作為兩個屬或亞屬的屬型，螺旋筆石一名一定要用在 *turriculatus*，因為它是早經 Bulman 指定過的屬型。雖然 Bulman 將螺旋筆石當作單筆石的同義名稱之一，但任何一個屬的屬型，一旦指定，不得更改。另外可以根據 *spiralis* 創立一新屬名以代替 Obyr 的螺旋筆石。筆者認為這兩個種最多祇能代表兩個亞屬，分別屬於單筆石和半把筆石。除 *Graptolithus turriculatus* Barrande 作為螺旋筆石亞屬 *Monograptus* (*Spirograptus*) 的屬型以外，現在我們以 *Graptolithus spiralis* Geinitz 作屬型，創立一新亞屬名，叫做奧氏筆石亞屬 *Demirastrites*

Elles 及 Wood (1912) 孫 雲 鑄 (1933) 許 傑 (1934) Bulman (1938) 張席祺、孫雲鑄 (1939) Ruedemann (1947) Harris 及 Thomas(1949)	尹 贊 勳 (1937) 穆 恩 之 (1948)	Hundt (1943) Pribyl (1946)	Obyr (1949)
Monograptus	單筆石亞科 Pristiograptus	鉛筆石亞科 Pristiograptus <i>Pristiograptus</i> <i>Colonograptus</i> <i>Saetograptus</i> 普氏筆石亞科 Pernerograptus	單筆石科 Monograptus <i>Pristiograptus</i>
<i>Monograptus</i>	Monograptus	單筆石亞科 Monograptus <i>Monograptus</i> <i>Globosograptus</i> <i>Mediograptus</i>	<i>Pomalograptus</i>
	Streptograptus	<i>Streptograptus</i>	<i>Streptograptus</i>
	Monoclimacis	Monoclimacis	Monoclimacis
	Demirastrites	Spirograptus 半把筆石亞科 Demirastrites	Tyrsograptus Spirograptus Campograptus Demirastrites
<i>Rastrites</i>	Rastrites	Rastrites	Rastrites

(*Obutograptus*)。這兩個亞屬的定義如下:

螺旋筆石(亞屬) 單筆石中,其筆石體旋轉彎曲,胞管呈彎鉤狀,恆具有口刺。

屬型: *Graptolithus turriculatus* Barrande.

奧氏筆石(新亞屬) 半耙筆石中,其胞管形狀始末均一,呈三角形,恆具有大小鉤狀口端。屬型: *Graptolithus spiralis* Geinitz.

最後,爲了更清楚起見,我們將不同作者對單筆石亞科的不同分類,相互對照,列表見第4頁。

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ON *SPIROGRAPTUS* GÜRICH

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While discussing the classification of the family Monograptidae Lapworth in 1948, the writer was of the opinion that the comprehensive genus *Monograptus* Geinitz (s. l.) may be divided into several genera as some German and Czech authors have done, although the classification has not yet been accepted by many authors. Some of these genera are based on the character of the thecae just as in the case of *Rastrites* Barrande which has been considered by all the graptolithologists as a subgenus of *Monograptus* or a distinct genus. *Rastrites* is based on the linear and isolated thecae, representing merely one of the main lines of the development of the thecae in Monograptids. Similarly, those genera which represent the other lines ought to be adopted. The writer is in complete agreement with Prof. T. H. Yin that the family Monograptidae Lapworth may be divided into two subfamilies, the Monograptinae and the Cyrtograptinae. The subfamily Monograptinae is composed of the following six genera:

Monograptinae (Lapworth) Yin Rhabdosome scandent, composed of one simple and uniserial stipe which is straight, curved or spirally coiled.

1. *Monograptus* Geinitz (s. s.) Monograptids in which the mature thecae are hooked. Genotype: *Lomatoceras priodon* Bronn.

2. *Pristiograptus* Jackel Monograptids in which the mature thecae are simple, straight tubes. Genotype: *Pristiograptus frequens* Jackel.

3. *Streptograptus* Yin Monograptids in which the mature thecae coiled into a definite lobe and more or less twisted. Genotype: *Monograptus nodifer* Törnquist.

4. *Monoclimacis* Frech Monograptids in which the mature thecae are sigmoid, forming a distinct excavation. Genotype: *Graptolithus vomerinus* Nicholson.

5. *Demirastrites* Eisel Monograptids in which the mature thecae are triangular or conical, usually with barbed terminations. Genotype: *Graptolithus triangulatus* Harkness.

6. *Rastrites* Barrande Monograptids in which the mature thecae are

linear and isolated. Genotype: *Rastrites peregrinus* Barrande.

Spirograptus Gürich is then considered as one of the synonyms of *Monograptus* Geinitz (s. s.), for the mature thecae of its genotype *Graptolithus turriculatus* Barrande are hooked, belonging to the *Monograptus sedgwickii* type.

In 1908, G. Gürich proposed the generic name *Spirograptus* for two species, namely *Graptolithus turriculatus* Barrande and *Monograptus subconicus* Törnquist, the latter being synonym of *Graptolithus spiralis* Geinitz. Later, in 1929, Bulman chose *Graptolithus turriculatus* Barrande as the genotype of the genus *Spirograptus* Gürich and considered it to be a synonym of *Monograptus* Geinitz.

The generic name *Spirograptus* had been used by Prof. Yin in 1937. It is not adopted in his later works.

In 1944, the Czech author A. Pribyl redefined this genus. He divided it into two groups, namely the group of "*Spirograptus*" *spiralis* Geinitz and the group of "*Spirograptus*" *communitis* Lapworth. *Graptolithus spiralis* Geinitz is regarded by him as the type of the first group, and the genotype of *Spirograptus*, *Graptolithus turriculatus* Barrande, is considered as the last member of that group.

It seems to the writer that Pribyl has listed *Graptolithus turriculatus* Barrande as the genoelectotype of the genus *Spirograptus*, but at the same time he redefined this genus based solely on the character of *Graptolithus spiralis* Geinitz. The diagnosis of *Spirograptus* given by Pribyl is quite different from the genotype, *Graptolithus turriculatus* Barrande. He described the species *Graptolithus spiralis* Geinitz more fully and refigured Bulman's text-figure to illustrate the thecal character of *Spirograptus*. On the other hand, while describing the species *turriculatus*, he says that the exact description of this species is hardly necessary, since this species has already been fully described by Barrande, Pernér and Elles and Wood.

Let us now turn to the Elles and Wood's work (1912). Based on the character of the thecae, Elles and Wood placed *Graptolithus turriculatus* Barrande in the group of *Monograptus priodon* (Bronn) which is the genotype of *Monograptus*. They pointed out that the thecae of *Monograptus turriculatus* (Barrande) is of general type of *Monograptus sedgwickii* (Portlock). These two authors illustrated the thecal character with some text-figures (figs.

301a-c on p.438) which are also accepted by Pribyl (1944, p.27). The writer (Mu, 1948, p. 226) was of the opinion that this species may be more reasonably placed under *Monograptus* (s. s.). It is evident that *Spirograptus* is a synonym of *Monograptus* (s. s.).

Neglecting this fact, Pribyl more recently still emphasized that the genus *Spirograptus* Gürich is characterized not only by a coiled rhabdosome, but especially by triangular thecae with a characteristic "Scepellum" (Pribyl, 1952, p.16). This is the character of *Graptolithus spiralis* Geinitz, but not of *Graptolithus turriculatus* Barrande. The triangular thecae with a so-called "Scepellum" is the characteristic feature of "Demirastinae" (*Demirastrites*) as defined by Pribyl himself (1946, p.283). Therefore *Graptolithus spiralis* Geinitz is obviously a member of the genus *Demirastrites* (s. l.) This species differs from the typical *Demirastrites* (s. s.) only in the uniform thecae. The thecae in the proximal part of the typical *Demirastrites* are more or less linear and isolated as those of *Rastrites*. This difference is in the writer's opinion at most a subgeneric character.

It appears clear that the so-called typical representatives of *Spirograptus* (e. g. *turriculatus* and *spiralis*) belong to two different genera. They are quite different in the thecal character, only similar in the coiled rhabdosome. The coiled rhabdosome is not a generic character, for a great number of species belonging to different genera may have the same character. It is thus unsafe to group some forms in one genus based on their coiled rhabdosome alone. The thecal character must be considered as one of the most important generic characters, just as those in Diplograptidae and Dimorphograptidae.

Besides these forms Pribyl further placed *Monograptus changyangensis* Sun in the genus *Spirograptus* Gürich. The writer fails to find any marked resemblance between this species and the genotype of *Spirograptus*, *Monograptus turriculatus* (Barrande). In the original description of *Monograptus changyangensis* Sun, Prof. Y. C. Sun writes clearly that the thecae of this species are very narrow and slender, the apertural margins are short and with a very acute denticle, and the free edge is almost straight (Sun, 1933, p.43). The thecae of this species are obviously of the simple, tubular type. Thence in the manuscript of "The index fossil of China", Prof. Y. C. Sun, Prof. Singwu C. Hsü and the writer have placed this species under *Monograptus* (*Pristiograptus*). In the same work *Monograptus turriculatus* (Barrande) and *Demiras-*

trites spiralis (Geinitz) are placed under *Monograptus* (*Monograptus*) and *Monograptus* (*Demirastrites*) respectively.

Recently, the Soviet palaeonologist A. M. Obut found out also the difference between *Monograptus turriculatus*(Barrande)and *Demirastrites spiralis*(Geinitz), and separated them into two genera. Unfortunately, he used the name *Spirograptus* with *Demirastrites spiralis* (Geinitz) as the genotype, and proposed a new generic name *Tyrsograptus* based on *Monograptus turriculatus*(Barrande).

Elles & Wood (1912) Sun (1933) Hsü (1934) Bulman (1938) Chang & Sun (1939) Ruedemann (1947) Harris & Thomas(1949)	Yin (1937) Mu (1948)	Hundt (1943) Pribyl (1946)	Obut (1949)
Monograptus	Monograptinae Pristiograptus	Pristiograptinae Pristiograptus <i>Prittiograptus</i> <i>Colonograptus</i> <i>Saetograptus</i> Pernerograptinae Pernerograptus	Monograptidae Monograptus <i>Pristiograptus</i>
<i>Monograptus</i>	Monograptus	Monograptinae Monograptus <i>Monograptus</i> <i>Globosograptus</i> <i>Mediograptus</i>	<i>Pomatograptus</i>
	Streptograptus	<i>Streptograptus</i>	<i>Streptograptus</i>
	Monoclimacis	Monoclimacis	Monoclimacis
	Demirastrites	Spirograptus Demirastritinae Demirastrites	Tyrsograptus Spirograptus Campograptus Demirastrites
<i>Rastrites</i>	Rastrites	Rastrites	Rastrites

If these two species may represent the types of two genera or subgenera, the name *Spirograptus* must be used for *Monograptus turriculatus* (Barrande) which is the genolectotype early chosen by Bulman, although it is considered as a synonym of *Monograptus* by the same author. It seems to the writer that these two species may represent two subgenera belonging to *Monograptus* and *Demirastrites* separately and that a new name should be proposed for *Demirastrites spiralis* (Geinitz) instead of Obut's *Spirograptus*. A new subgeneric name *Obutograptus* is here proposed. These two subgenera are diagnose dnow as follows:-

Monograptus (*Spirograptus*) Gürich, emend. *Monograpti* in which the rhabdosome is spiral, the thecae are hooked usually with apertural spines. Subgenolectotype: *Graptolithus turriculatus* Barrande.

Demirastrites (*Obutograptus*) subgen. nov. *Demirastrites* in which the thecae are uniform, triangular, usually with barbed terminations. Subgenotype: *Graptolithus spiralis* Geinitz.

Finally, for the sake of clarity, we correlate the classification of the simple Monograptids given by different authors in the above table (see p.9).