古生物誌乙種第五號　田奇瓏著

第一册

中國北部太原系海百合化石

中華民國十五年四月　農商部地質調查所印行

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引言

（一）發見——整理

海百合化石在中國北部分佈雖廣、然保存者皆屬於莖部、其以整個發見者、則未之前聞、故其首先發見於直隸臨城煤田內之太原系、誠一饒有興趣之事。產此之岩層爲一夾於后溝石灰岩層內之紅色泥質岩、乃余及王竹泉趙亞曾兩君於民國十二年孟冬調查該地煤田地質時所發見者也。惟爾時所採集者、概係體臂莖各部之零星散板（Plates）、其整個則至翌年春、余與趙亞曾君同奉翁所長命調查磁州及六河溝一帶煤田地質時、余乘由六河溝歸途之便、再臨該地盡一日之搜尋、始克發見。計得幾全部整個者一、體部整個者一、體部上半部完全保存者二、外尙有各部散板數百餘枚、與前次所獲總計不下七百餘枚、經集散爲整修理再造之結果、復得體部之整個六枚。

此種整理工作、雖非難事、殊亦不易、因多至七百餘枚之散板、均須一一去其附着物（如泥土岩石之類）、且須一一別其種屬、明其位置及其相互之關係、以是費時頗多。余欲此種工作進行順利、及避免錯誤起見、首聚集各種散板、用毛刷或小劈刀一一加以洗淨、同時復按屬分類、繼復由各屬按種分類、然後始按各種體板（Thecal plates）之大小形狀、用一種蠟質物（最好用模型土）作各種與其體形等似之模型、再按其位置、次第嵌上。至於種之辨別、除依據體板之大小及形狀外、復以其表面性質何如而定。余於構造上雖不敢自謂毫無錯誤、然如體板之必屬於同種、（即令不嘗盡屬於同一個體）而各居於固有之位置、此則堪可自信者也。

臨城煤田內石灰岩露出者凡三層、其產海百合化石之紅色泥質岩、即屬於位於中間而名后溝石灰岩層者是也。此石灰岩層產化石極富、除海百合化石外、尙有珊瑚類、腕足類、腹足類、頭足類等化石頗多、保存亦甚完美。其上下兩石灰岩層雖亦富產化石、但於海百合類則祇見其破碎不完之莖而已。

(二)古生代棘皮動物之分佈

(甲)中國

古生代棘皮動物在中國產量之稀少、固大半由於產此之岩層、尙未盡量發見、殆亦爲可注意之事實。其至今已見或未見諸載册者、祇海百合(crinoids)海林檎(cystoids)海膽(Echinoids)三類而已。

海百合類在中國北部石炭紀地層、分佈雖廣、惟保存者大都屬於莖部、且常堆集成層而名曰海百合石灰岩(Crinoidal limestone)。其除於雲南發見二三尙未鑑定之寒武紀海百合體板、少數奧陶紀之 *Camerocrinus asiaticus*、泥盆紀之 *Cupressocrinus abbreviatus*、及中三疊紀之 *Encrinus liliiformis* 外、其餘則均以石炭紀及二疊紀爲限。

海膽類則祇於直隸唐山石灰岩、湖北巫山石灰岩、雲南中三疊系有所發見。其發見於唐山石灰岩者爲 *Archæocidaris* 及 *Melonites* 之體板及刺、前者葛利普教授認爲有兩新種、其一已定名爲 *Archæocidaris tungshanensis*。發見於巫山石灰岩者則爲 *Archæocidaris* 之體刺。發見於雲南之中三疊系者則爲 *Cidaris* 之體板及刺。

海林檎類則祇見於雲南奧陶紀、其已爲 Reed 鑑定者、於蒲縹有 *Echinosphæra* cf. *aurantium* Bather. *Echin-*

ocrium sp., *Caryocrinus* cf. *turbo* Bather. *Proterinus* sp., *Heliocrinus* sp., 各種。於施甸則有 *Sinocystis loczyi* Reed, *S. yunnanensis* Reed. *Ovocystis mansuyi* Reed, *Pyrocystis ? orientalis* Reed. *Eucystis* cf. *varipunctata* (ang.) *Echinosphæra asiaticus* Reed, *E. shiltiensis* Reed, *Spheronis lobiferus* Reed, *S. shiltiensis* Reed, *Heliocrinus fiscella* Bather, *H. quahs* Bather, *H. subovalis* Reed, *H.* cf. *baltieus* Eichw., *Caryocinus bicompressa* Reed 各種。

(八) 亞洲其他各部

古生代棘皮動物產於亞洲其他各部而已見諸載册者，於印度之 Salt Range 則有 Waagen 所著之二疊紀海百合類四屬六種、海膽類一種（詳見原文八頁）。於 Burma 之 Northern Shan States 則有 Reed 及 Bather 所著之奧陶紀海百合一種、海林檎類五屬九種（詳見原文八頁）。於 Timor 則有 Wanner 所著之二疊紀海百合類五十六屬、一百七十四種、變種二十一（詳見原文九頁至十四頁）。又其所著之二疊紀海膽類共屬一十三種二十四、變種六（詳見原文十四頁及十五頁）。此外 Mansuy 於安南之 Proluctus limestone，亦有海膽類之體板及刺之發見，此或屬於 *Archæocidaris* 一屬，日本對於古生代棘皮動物，據 Tokunaga 之報告，雖尚無重要之發見，而於中生代及近生代則發見海林檎類頗多，且大半至今猶綿延不絕云。

(三) 臨城化石研究之結果

由上述可見此種動物，在亞洲之產地實屬有限，故其以完美之保存，發見於臨城煤田之太原系，匪惟饒有興趣，誠亦出於意外。其中雖有多數經壓力而呈多少破碎不整之狀，但就大體而論，其各體板之位置均無錯落，實無一不足以資比較而詳細記述之。余在葛利普教授殷勤指導之下，從事研究之結果，得 *Sinocrinus* 新屬

Dicyclica Bather.

Genus **SINOCRINUS** Tien (gen. nov.)

1. *Sinocrinus microgranulosus* Tien (sp. nov.)
2. *S.* ,, var. *pentalobosus* Tien (var. nov.)
3. *S. linchengensis* Tien (sp. nov.)
4. *S. nodosus* Tien (sp nov.)
5. *S.* ,, var. *spinosus* Tien (var. nov.)
6. *S. houkouensis* Tien (sp. nov.)

Genus **EUPACHYCRINUS** Meek & Worthen

7. *Eupachycrinus pustulosus* Tien (sp. nov.)
8. *E.* ,, var. *transversus* Tien (var. nov.)
9. *E.* ,, var. *contractus* Tien (var. nov.)
10. *E. linchengensis* Tien (sp. nov.)

Genus **GRAPHYOCRINUS** Konn.

11. *Graphyocrinus houkouensis* Tien (sp. nov.)

Monocyclica Bather.

Genus **PLATYCRINUS** Miller

12. *Platycrinus* sp.

一、*Eupachycrinus*, *Graphyocrinus* 及 *Platycrinus* 舊屬三、新種共八、新變種共四。茲表列如後。

此海百合動物羣雖因參考書缺乏、不能與歐美石炭紀種屬一一詳資比擬、以明其關係、然就 *Eupachycrinus* 及 *Platycrinus* 二屬而論、則此動物羣似與歐種較爲近似耳。至其與 Timor 二疊紀海百合羣相共同者、祇有 *Graphycrinus* 及 *Platycrinus* 二屬而其種又無一相似、其餘在 Timor 則以新屬居多、其中雖有 *Lopediocrinus* 及 *Calycocrinus* 兩新屬就其 anal plates 完全消滅而言、似可與 *Sinocrinus* 相比擬、然如就 Infrabasal 之演化而論、一則係三板合成、一則已全部膠合而成一體、較之 *Sinocrinus* 仍爲五板合成者、不可同日而語矣、且臂部之構造又各絕不相同、是此兩動物羣無若何直接之關係、或可斷言也。

斯誌之作、多承葛利普師殷勤指教、應矢勿諼。翁文灝先生於中英緒言文字之詳賜教正、李四光先生對於此著作之勉勵有加、均應銘感。那銳峯君擔任繪圖、亦應感激。謹誌於此。

CRINOIDS FROM THE TAIYUAN SERIES OF NORTH CHINA

BY

C. C. TIEN

INTRODUCTION

The discovery of fossil crinoids in the Taiyuan Series of the Lin Cheng coal field of S. Chihli is of great interest, because they are the first complete specimens found in any formation in China. They were discovered in a red shaly bed intercalated in the Houkou limestone by Messrs. C. C. Wang, Y. T. Chao and myself, in the course of our survey of the Lin Cheng coal field in the fall of 1923. In the collections we made at that time the remains of these interesting animals were all represented by fragments of arms and stems, and numerous isolated plates of the theca. No complete crown or theca was obtained until the spring of 1924. Then, on the way back to Peking from the Liu Ho Kou coal field, I was so fortunate, on visiting these outcrops again and making a special search for crinoids, as to find one nearly complete crown, one complete theca, two upper half portions of thecæ, one of them with anal plates and brachials in their natural positions, and hundreds of isolated plates, as well as many fragments of free arms and stems. With these separated plates and those collected last fall, I have succeeded in restoring six more or less complete calices. This work was not an easy one, because it required much care and time to clean so many plates from the soil and sometimes from the rock, and also much care and attention to detail to separate so many plates into their proper genera and species, and to recognize their real relations to one another in the theca of each genus and species. In order to carry on this work most expeditiously and to avoid mistakes, I first gathered together all the plates, cleaning them one by one with a brush or a small wedged knife. At the same time I carefully compared and classified them into generic groups. After all the preparation and

classification had been completed, I took up one group and separated the plates according to their specific characters. This proceeding was followed in all the generic groups. Before carrying on the work of reconstruction I attemped to determine the exact positions of the anal plates and their real relations to the other plates of the crown in each genus and species. The distinction of species was made on the basis of the different measurements and the different surface characters of the plates. Although I can not feel certain that my reconstructions are without errors, yet I believe that in each reconstruction the plates, though not always of the same individual, still belong to the same species and all are in their proper positions.

In the Lin Cheng coal field there are three limestone beds exposed. The red shaly bed yielding the fossil crinoids is a member of the middle one, called the Houkou limestone from the name of a village near by. The Houkou limestone is the richest fossiliferous bed, and from it besides the beautiful specimens of crinoids, we also obtained numerous well preserved specimens of corals, brachiopods, pelecypods, gastropods and cephalopods.

PREVIOUSLY DESCRIBED SPECIES—I CHINA.

The extreme rarity of *Palæozoic Echinodermata* in China is a noticeable fact, although to a large extent this may be due to our incomplete acquaintance with the crinoid-bearing formations of this country. Up to the present, representatives of only three classes of *Palæozoic Echinodermata* viz.; *Crinoidea*, *Cystoidea* and *Echinodea*, are known. The former, although very abundant and wide-spread in the Carboniferous strata of North China, are largely represented by stem joints, these often occurring in the limestones in great abundance and even forming typical crinoidal limestones. Except for two or three undetermined thecal plates of crinoids from the Cambrian of Yunnan, and a few specimens of *Camerocrinus asiaticus* Reed from the Ordovician, one complete dorsal cup of *Cupressocrinus obbreviatus* Frech from the Devonian, and several specimens of *Encrinus liliiformis* Lam. described by Loczy from the middle Trias of the same province, all the known forms are confined to the Carboniferous and the Permian. A few fragments of stems from the Permian formations of the Kai-Ping basin have been figured and described by Prof. A. W. Grabau who refers them to *Cyathocrinus*, there being at least two species (Bulletin of Geological Survey of China, No. 2, p. 76, pl. IX, fig. 8-11). Stems of *Cyathocrinus* have also been described by Loczy from the Lower Permian beds of the Lan Tsan Kiang valley, near Yar-Ko-Lo, from the Carboniferous beds of Kan-Tschou-Fu, Kansu, and also with those of *Poteriocrinus* from the Permo-Carboniferous beds of Ta-Li-Chou, Yunnan. *Echinoidea* are so far known from the Tangshan limestone of Chihli, the Wushan limestone of Hupeh and the middle

Trias of Yunnan. From the former a few plates and spines of *Archæocidaris* and *Melonites* have been obtained, the first probably including two species one of which has been determined, but not yet described, by Prof. A. W. Grabau as *Archæocidaris tangshanensis*. From the Wushan limestone only a spine of *Archæocidaris* has recently been obtained. From the middle Trias several plates and spines have been obtained and described by Loczy as *Cidaris*. *Cystoidea* are so far known only in the Ordovician of Yunnan where a great number of species has been found and described by Reed in the Palæontologia Indica, New Series, Vol. VI, Memoir No. 3; these being as follows:—

ORDOVICIAN CYSTOIDS FROM YUNNAN

I. From Pu-Piao

Echinosphæra cf. *aurantium* Bather
Echinocrinus sp.
Caryocrinus cf. *turbo* Bather
Protocrinus? sp.
Heliocrinus? sp.

II. From La-Meng

Heliocrinus aff. *fiscella* Bather

III. From Shih-Tien

Sinocystis loczyi Reed
S. yunnanensis Reed
Ovocystis mansuyi Reed
Pyrocystis? orientalis Reed
Eucystis cf. *raripunctata* (Ang.)
Echinosphæra asiaticus Reed
E. shihtiensis Reed
Spheronis lobiferus Reed
S. shihtiensis Reed
Heliocrinus fiscella Bather
H. qualus Bather
H. subovalis Reed
H. cf. *balticus* Eichw.
Caryocrinus bicompressa Reed

II FOREIGN COUNTRIES

If we now turn to the foreign literature to discover descriptions of *Palæozoic Echinodermata* from other parts of Asia, we find no other notices but those written by Waagen on the Permian crinoids and echinoids from the Productus limestone of the Salt Range (Mem. of Geol. Sur. of India, Ser. 13, Vol. 1. pp. 818-834); by Bather and Reed on the Ordovician cystoids and crinoids from the Northern Shan States, Burma (Mem. of Geol. Sur. of India, New Ser., Vol. 2, No. 3.); and by Wanner on the Permian crinoids (Perm. Krin. v. Timor v. Wanner, and Perm. Echin. v. Timor I. v. Wanner) and blastoids (Perm. Blast. v. Timor v. Wanner) from the island of Timor. A list of these fossils is here given.

A. ORDOVICIAN CYSTOIDS AND CRINOIDS FROM THE NORTHERN SHAN STATES, BURMA.

CYSTOIDS

Aristocystis dazon Bather
Heliocrinus qualus Bather
H. fiscella Bather
Echinocrinus cf. *angulosus* Pander (?)
E. aff. *senckenbergi* Meyer.
Caryocrinus avellana Bather
C. aurora Bather
C. turbo Bather
C. ? 2 sp.
Protocrinus sparsiporus Bather

CRINOIDS

Camerocrinus asiaticus Reed

B. PERMIAN ECHINOIDS FROM THE SALT RANGE.

Eocidaris forbesiana de Koninck

C. PERMIAN CRINOIDS FROM THE SALT RANGE.

Phillocrinus cometa de Kon.
Cyathocrinus indicus Waagen.
C. kattaensis Waagen
C. goliathus Waagen
C. virgalensis Waagen
Hydrocrinus ? sp.
Poteriocrinus ? 2 sp.

D. PERMIAN CRINOIDS FROM TIMOR.

CAMERATA

Actinocrinus permicus Wann.
A. timoricus Wann.
A. brouweri Wann.
A. dilatatus Wann.
A. brevispina Wann.
Platycrinus wachsmuthi Wann.
P. cf. *rugosus* Mill.
Pleurocrinus spectabilis Wann.
P. pusillus Wann.
P. globosus Wann.
P. depressus Wann.
P. goldfussi Wann.
Neoplatycrinus dilatatus Wann.
N. major Wann.
N. transitorius Wann.
N. somoholensis Wann.
Eutelecrinus piriformis Wann.
E. poculiformis Wann.
E. elongatus Wann.
E. erectus Wann.
E. mangostanus Wann.
E. inflatus Wann.
E. depressus Wann.
E. welteri Wann.
E. subglobosus Wann.
Camptocrinus indoaustralicus Wann.

FLEXIBILIA

Loxocrinus globosus Wann.
L. dilatatus Wann.
Petrocrinus beyrichi Wann.
P. kukaensis Wann.
Syntomocrinus sundaicus Wann.
Calycocrinus curvatus typus Wann.

Calycocrinus curvatus informis, Wann.
C. ,, *elongatus*, Wann.
C. ,, *depressus*, Wann.
C. ,, *subcoronatus*, Wann.
C. ,, *coronatus*, Wann.
C. ,, *subturbinatus*, Wann.
C. ,, *turbinatus*, Wann.
C. kupanensis Wann.
C. amarassicus Wann.
C. crassus Wann.
C. spinosus Wann.
C. piriformis Wann.
C. malaianus Wann.
C. major Wann.
C. poculum Wann.
C. granulatus Wann.
C. ,, var. *altior* Wann.
C. palella Wann.
C. millericrinoides Wann.
Plagiocrinus torynocrinoides Wann.
P. jaekeli Wann.
Prophyllocrinus dentatus Wann.
P. cuspidatus Wann.
Proapsidocrinus permicus Wann.
Ancistrocrinus vermistriatus Wann.
Rumphiocrinus singularis Wann.
Palaeoholopus pretiosus Wann.
Thalassocrinus gracilis Wann.

INADUNATA

FISTULATA

Paracatillocrinus granulatus Wann.
P. ellipticus Wann.
P. spinosus Wann.
Nereocrinus antiquus Wann.
Oceanocrinus granulatus Wann.

Bolbocrinus hieroglyphicus typus Wann.
B. ,, *tuberculatus* Wann.
B. ,, *exorlatus* Wann.
B. *rex* Wann.
B. waldthauseniae var. *basleensis* Wann.
B. turbinatus Wann.
B. pusillus Wann.
B. waldthauseniae Wann.
Thetidicrinus piriformis Wann.
Cydonocrinus turbinatus Wann.
Hypocrinus schneideri Beyr.
Metasycocrinus piriformis Rothpl.
Monobrachiocrinus ficiformis Wann.
M. ,, var. *elongata* Wann.
M. granulatus Wann.
Coenocystis richardsoni Wann.
C. somoholensis Wann.
Lageniocrinus seminulum de Kon. & le Hon.
var. *timorensis* Wann.
Allosycocrinus pusillus Wann.
A. medius Wann.
A. grandis Wann.
Embryocrinus hanieli Wann.
Poteriocrinus malaianus Wann.
Malaiocrinus sundaicus Wann.
M. crassitesta Wann.
Mollocrinus poculum Wann.
M. paucituberculatus Wann.
M. ornatissimus Wann.
Ulocrinus indicus Wann.
Sundacrinus granulatus Wann.
S. triangulus Wann.
S. vastus Wann.
Trimerocrinus pumilus Wann.
T. ventriosus Wann.
T. pentagonus Wann.

Hydreionocrinus amarassicus Wann.
H. variablis Wann.
Roemerocrinus gracilis Wann.
Strongylocrinus molengraaffi Wann.
Indocrinus elegans Wann.
I. crassus Wann.
I. nodosus Wann.
I. rimosus Wann.
Synyphocrinus trautscholdi Wann.
S. indicus Wann.
Paraburscacrinus procerus Wann.
P. compressus Wann.
P. conus Wann.
P. pyramidatus Wann.
P. ,, var. *granulata* Wann.
P. magnifiens Wann.
Graphiocrinus timoricus Wann.
G. ,, var. *spinosa* Wann.
G. amplior Wann.
G. punctatus Wann.
G. indicus Wann.
G. exornatus Wann.
G. quinquelobus Wann.
Bursacrinus magnificus Wann.
B. procerus Wann.
B. pyramidatus Wann.
Ceriocrinus depressus Wann.
C. verbeeki Wann.
C. ,, var. *vermistriata* Wann.
C. ,, var. *levis* Wann.
C. ,, var. *pumila* Wann.
C. rugosus Wann.
C. crassus Wann.
C. expansus Wann.
C. excavatissimus Wann.
C. rotundatus Wann.