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***Circinatus* NEW SUBGENUS
AND THREE NEW SPECIES OF
Pterostichus FROM CHINA
(Coleoptera Carabidae)**

SUMMARY - *Circinatus* new subgenus of *Pterostichus* from China is described. This subgenus includes the species *baenningeri*, *pohnerti* and *liciniformis*, up to now considered as *incertae sedis*, and the new species *P. zoiai*, *P. beneshi* and *P. subtilissimus* from Sichuan here described and figured. The overall geographic range of the subgenus is limited to the regions of Sichuan and Yunnan.

RIASSUNTO - *Circinatus* nuovo sottogenere e tre nuove specie di *Pterostichus* della Cina (Coleoptera Carabidae). Viene qui descritto *Circinatus*, nuovo sottogenere di *Pterostichus* della Cina. Questo sottogenere comprende *P. baenningeri*, *pohnerti* e *liciniformis*, finora inclusi *incertae sedis* nel genere *Pterostichus*, e le nuove specie *P. zoiai*, *P. beneshi* e *P. subtilissimus* del Sichuan, qui descritti e raffigurati. Il suo areale distributivo complessivo è limitato alle regioni del Sichuan e dello Yunnan.

INTRODUCTION

The study of interesting material from China recently collected by various entomological expeditions has allowed me to recognise, among the others, three species of *Pterostichus* described in the past but still insufficiently known and three more species species certainly related to these but clearly different.

The earliest species of the group here treated is *Pterostichus liciniformis*, described as belonging to *Steropus*. Later, JEDLIČKA (1931, 1934) described two more species allied to this, but did not compare them neither to *P. liciniformis* nor to each other. In his revision of the East-Asian *Pterostichini*, JEDLIČKA (1962) lists all these three species at the end of the genus, among those *incertae sedis*.

MORVAN (1972) compares some Himalayan species of *Pterostichus* with «*Licentius baenningeri*». This clearly derives from the fact that MORVAN did not understand that the species treated by JEDLIČKA after the subgenus *Licentius* were to be regarded as *incertae sedis* and not as belonging to that subgenus.

Studying abundant material of these three species, and of three more new to science, I could realize that they do not fit in any of the subgenera known to day. Neither *Pterostichus* s. str., to which CSIKI (1930) attributed *P. liciniformis*, nor *Steropus*, in which this species was originally described, are suitable for a subgeneric inclusion of these three species, the-

refore I decided to describe a new subgenus.

The criteria for assigning this group a subgeneric rank are based mainly upon the study of other *Pterostichini* from China (SCIAKY, 1994a, 1994b). When a group is well delimited, with no intermediate forms with other groups and shows a biogeographic consistency it should be considered a distinct subgenus. This group is not only well distinct from all the other known subgenera of *Pterostichus*, but also probably monophyletic, as all the species are quite homogeneous. I therefore consider that in this case the rank of subgenus is deserved.

Acronyms used in this publication are as follow:

NHMB - Naturhistorisches Museum, Basel	CB - Coll. Brezina
NHMW - Naturhistorisches Museum, Wien	CL - Coll. Locca
MSNM - Museo Civico di Storia Naturale di Milano	CS - Coll. Sciaky
CBe - Coll. Beneš	CV - Coll. Vigna Taglianti

Circinatus nov. subg.

Diagnosis

A subgenus of *Pterostichus* of medium size, characterised by the rounded shape of pronotum. Third interval of elytra with two pore-punctures in the apical half, aedeagus with apex pointed, more or less placed on the left as in the “normal” *Pterostichini*; left paramere short and stout, pointed or dilated at tip.

Derivatio nominis

The name of this subgenus derives from the Latin adjective «*circinatus*», meaning «rounded», and alludes to the shape of the pronotum of these species.

Type species: Pterostichus pohnerti Jedlička, 1931.

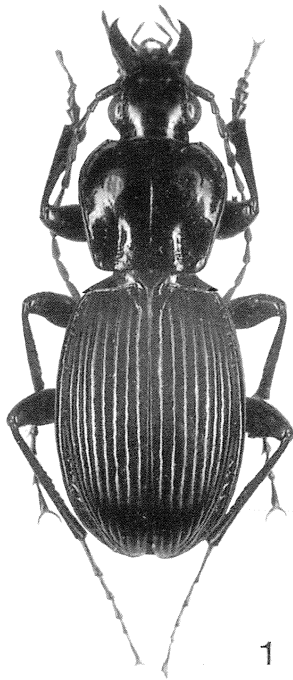
Description

Head convex, smooth, with frontal sulci simple and almost parallel. Antennae and legs long and slender.

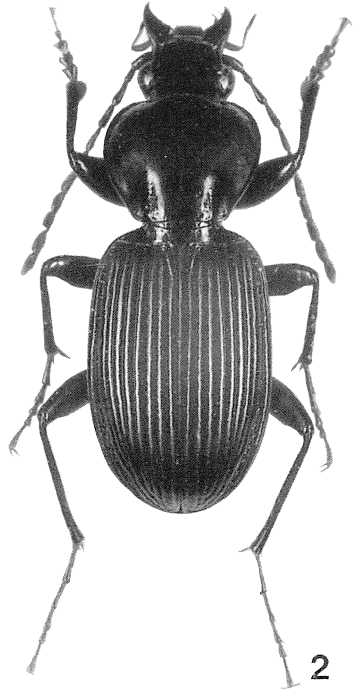
Pronotum weakly convex, always with widely rounded basal angles, with median sulcus very distinct and deep. one big basal depression, impunctate or with few scattered points; sometimes a small external one is present too, always shorter and less distinct than the internal. The hind lateral seta is never in the hind angle, but constantly in front of it, more or less so, according to the species.

Elytra relatively long, oval or parallel-sided, with rounded humeri. Striae complete, punctate or impunctate, scutellar stria rudimental or absent. Sterna laterally punctate; last sternite of male smooth, with no particular characteristics.

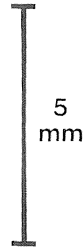
Aedeagus with prebasal portion relatively thin, ostium placed on the left side, as in



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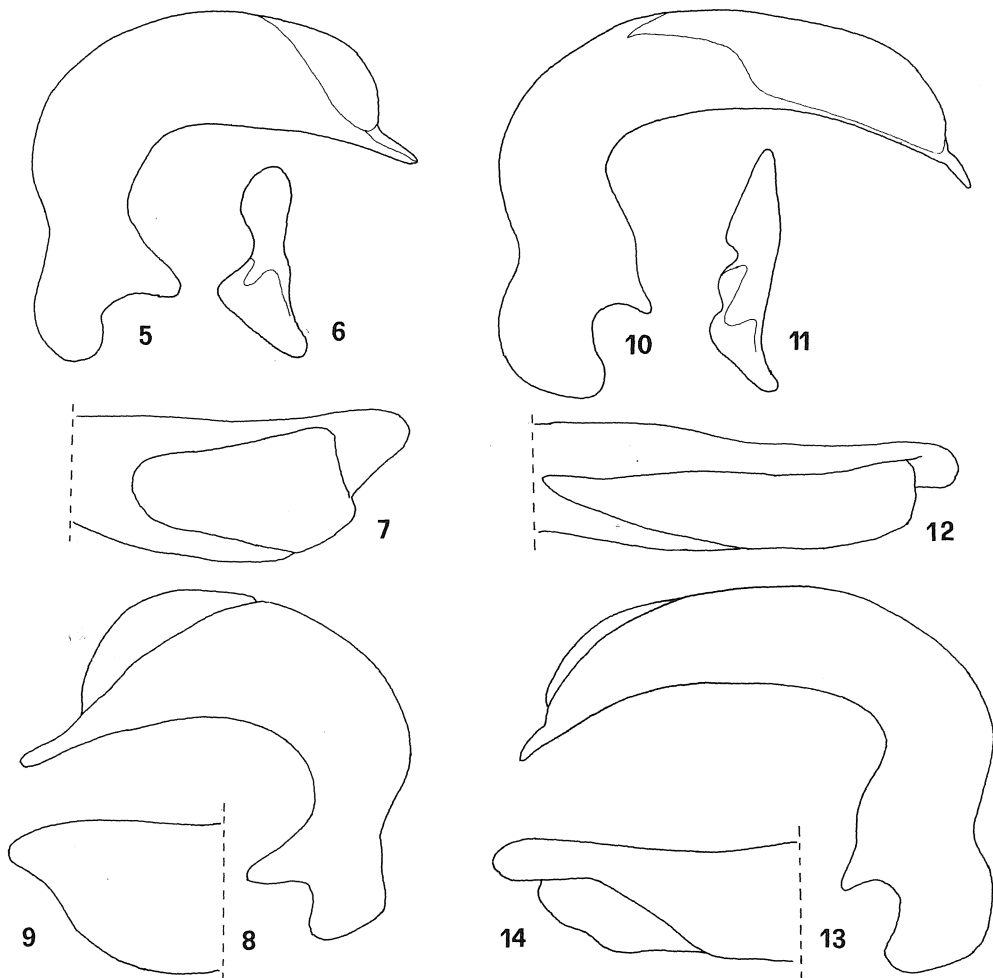


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Figs. 1-4 - Habitus of: 1: *P. pohnerti*; 2: *P. baenningeri*; 3: *P. zoiat*; 4: *P. liciniformis*.



Figs. 5-14 - Aedeagus in left lateral (5), dorsal (7), right lateral (8) and ventral (9) view and right paramere (6) of *P. po'neri*; aedeagus in left lateral (10), dorsal (12), right lateral (13) and ventral (14) view and right paramere (11) of *P. baenningeri*.

the "normal" Pterostichini, even though in two cases the position is less lateral than in the other species, nearly dorsal. The right paramere is constantly short and straight, dilated and rounded at tip or pointed.

Systematic position

The systematic position of this new subgenus is not easy to define. Actually I have not been able to find any clear relationship with any other group. The shape of pronotum reminds that of *Steropus*, but all the other characters, mainly the aedeagal ones, are comple-

tely different. Another subgenus with a similar pronotal shape is *Sinosteropus* Sciaky, 1994, but in this case too the other characters are completely different; *Sinosteropus* is a subgenus with five species diffused in Yunnan, Sichuan and Shaanxi, characterized by small size, short legs and antennae and a tendency towards an endogeous way of life (SCI AKY, 1994b).

***Pterostichus (Circinatus) pohnerti* Jedlička, 1934**

Pterostichus pohnerti Jedlička, 1934: 19. Type-locality: Sichuan, Tatsienlu [= today: Kangding].

Even though it was described from «Tatsienlu», this species lives at much higher altitude, on Gongga Shan (= Minya Konya), a mountain of over 7000 m a.s.l. The type locality, like in many other cases, must therefore be considered as «Tatsienlu area». I have examined 70 specimens collected in different stations of the Gongga Shan massive, and in particular in:

Gongga Shan massive, 3100 m, upp. Hailuogou vall. (camp 3), 29°35' N/101°59'E (CB, CS); Gongga Shan, Yantsoko, 3800-3900 m (CS, CV); Luding co., Moxi env., 3000 m (CBe, CS).

It is clearly distinct from the other species of the subgenus in having a small but acute and prominent humeral tooth and the elytra with base very narrow and sides distinctly rounded (fig. 1).

Genitalia. Aedeagus rather short, with ostium placed on left side. Prebasal portion strongly concave, apex simple, rectilinear in lateral view (figs. 5, 8), in dorsal view with a wide apical lamella (fig. 7); internal sac not visible in ventral view (fig. 9). Right paramere relatively short and straight, dilated at tip (fig. 6).

***Pterostichus (Circinatus) baenningeri* Jedlička, 1931**

Pterostichus baenningeri Jedlička, 1931: 24. Type-locality: China, Sichuan, Chung-king [= today: Chongqing].

This species is known only from the type-locality, in Sichuan and has been described from 11 specimens, all males. I have studied two paratypes (MSNM, CS).

The identification of the type-locality of this species is not obvious, as in Sichuan there are two towns with the same name Chongqing. The largest one is in southern Sichuan, near the border of Guizhou, at very low elevation, while a smaller one is in western Si-

chuan, north-west of Kangding. Studying the species described from «Chungking», I could realize that they are often related to species of other localities in western Sichuan; For instance, *Pterostichus (Morphohaptoderus) chungkingi* Jedlička, 1932 from Chung-king is strictly related to *Pterostichus (Morphohaptoderus) irideus* Sciaky, 1994 from Emei Shan and *P. baenningeri* shows clear relationships with *P. zoiai* n. sp., here described, also from Emei Shan. Therefore I consider it very likely that the type-locality of these species is Chongqing in western Sichuan.

This species has no humeral tooth and is therefore easily distinguished from *P. pohneri*; the elytra are parallel-sided and less constricted at base than in *P. zoiai* (fig. 2). Furthermore, this is the only species of this group in which the onychium presents some setae ventrally.

Genitalia. Aedeagus long, with ostium placed on left side. Prebasal portion strongly concave, apex simple, rectilinear in lateral view (figs. 10, 13), in dorsal view with a wide apical lamella (fig. 12); internal sac partially visible in ventral view (fig. 14). Right paramere relatively short and straight, pointed at tip (fig. 11).

***Pterostichus (Circinatus) zoiai* n. sp.**

Diagnosis

A *Pterostichus (Circinatus)* of medium size (9.1-10.3 mm), related to *P. baenningeri* but different in the smaller size, narrower pronotum and elytra and different median lobe of aedeagus, which has the ostium almost dorsal in position.

Type-locality: China, Sichuan, Emei Shan.

Type series: Holotypus ♂ (NHMB). 45 paratypes ♂♂ ♀♀ topotypical (NHMB, CL, CS).

Derivatio nominis

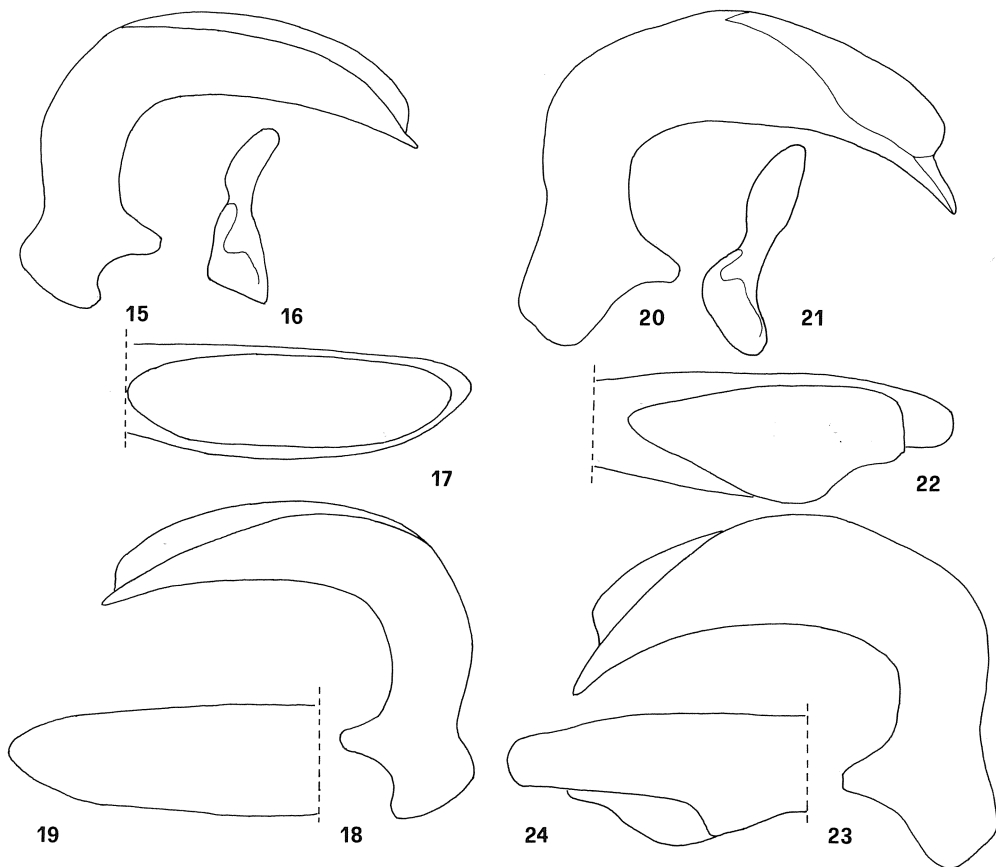
This species is dedicated to my friend Stefano Zoia, specialist in Coleoptera Choleviidae, whom I have often accompanied on entomological expeditions.

Description

Size mm 9.1-10.3; body and appendages dark brown, palpi, antennae, tarsi and knees reddish-brown. Habitus as in fig. 3.

Head elongate, smooth, much narrower than pronotum; eyes feebly convex. Tempora long and obliquous, collar constriction evident but not very deep.

Pronotum long, hardly transverse, constricted in the basal half. Fore angles not projecting forward, hind angles largely rounded. Lateral gutter narrow all along its development;



Figs. 15-24 - Aedeagus in left lateral (15), dorsal (17), right lateral (18) and ventral (19) view and right paramere (16) of *P. zoiat*; aedeagus in left lateral (20), dorsal (22), right lateral (23) and ventral (24) view and right paramere (21) of *P. liciniformis*.

base weakly concave. Basal impressions single, long, linear, impunctate and smooth. Index width pronotum/length pronotum = 1.14, index length elytra/length pronotum = 2.14, index width elytra/width pronotum = 1.21.

Elytra narrow (index length/width = 1.53) and convex, weakly dilated in apical half; striae deep and strongly punctate; intervals weakly convex. Third interval with two setigerous punctures in the apical half, adjoining stria 2, the anterior just after the middle, the posterior at three-quarters of the elytral length. Shoulders rounded, the basal margin forming a largely obtuse angle with the lateral one. Umbilicate series composed by 7+1+9 setigerous punctures.

Legs long and slender; onychium without setae underneath.

Aedeagus long, with ostium almost dorsal in position. Prebasal portion strongly concave, apex simple, rectilinear in lateral view (figs. 15, 18), in dorsal view with a small apical lamella (fig. 17); internal sac not visible in ventral view (fig. 19). Right paramere relatively short and almost straight, neither dilated nor pointed at tip (fig. 16).

Affinities

This species is externally similar to *P. baenningeri*, from which it can be distinguished through the narrower pronotum and elytra and the completely different shape of the aedeagus. It is even more similar to *P. beneshi*, here described, which also has the same aedeagal shape. It is very curious that these two species, so similar to the others in habitus and other characters, have such a different shape of aedeagus. Actually, this organ has an almost completely dorsal ostium, with very small apical lamella, while in all the other species the position is more or less placed on the left side and sometimes even visible in ventral side. In spite of this, all the characters prevent me from excluding these species from the subgenus.

Distribution

The type-locality of this species, Emei Shan, is a mountain of 3099 m in western Sichuan, at the margin of the plain. This mountain, well known among botanists for the very high number of endemic species of plants, is showing a rich endemic fauna as well. Among the endemic species of Coleoptera Carabidae I can mention *Epaphiopsis budhaica* (Deuve, 1988), *Epaphiopsis perreaui* (Deuve, 1988), *Nebria (Eunebria) rougemonti* Ledoux & Roux, 1988, *Pterostichus (Morphohaptoderus) emei* Sciaky, 1994, *Pterostichus (Morphohaptoderus) irideus* Sciaky, 1994, *Trigonognatha cavazzutii* Casale & Sciaky, 1994, *Trigonognatha brancuccii* Sciaky, 1995, *Pterostichus (Anomostichus) anomostriatus* Sciaky (in press), and several other species still in study.

***Pterostichus (Circinatus) liciniformis* Csiki, 1930**

Pterostichus (s. str.) liciniformis Csiki, 1930: 669 *nom. nov.*

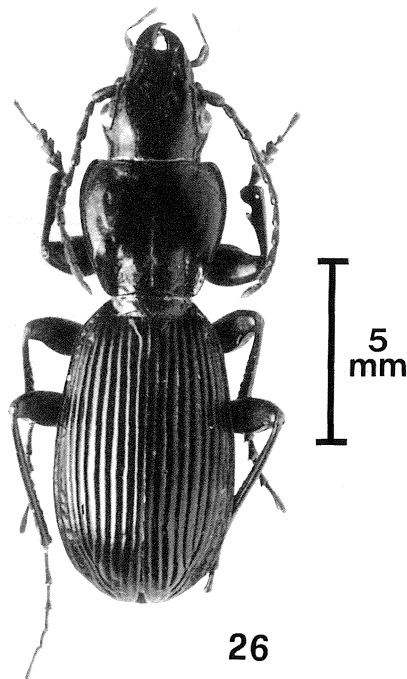
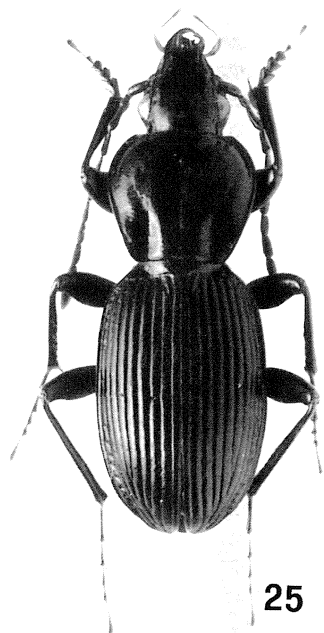
Steropus licinoides Fairmaire, 1888: 10 (*nec* Motschoulsky, 1865). Type-locality: China, I Yunnan.

Earliest species described of this group, *P. liciniformis* has been described as a *Steropus*, but after the original description there are no mentions of this species, except those of CSIKI (1930) and JEDLIČKA (1962). The former noticed the secondary homonymy with Motschoulsky's species and proposed the present valid name, the latter treated the species as *incertae sedis* within the big genus *Pterostichus*.

This species is known only from the region of Yunnan. I have seen about thirty specimens collected in 2 localities:

Yulongshue shan, Ganhaizi pass; Heishu, 35 km N of Lijang.

Aedeagus long, with ostium placed on left side. Prebasal portion strongly concave, apex simple, rectilinear in lateral view (figs. 20, 23), in dorsal view with a wide apical lamella (fig. 22); internal sac not visible in ventral view (fig. 24). Right paramere relatively short and straight (fig. 21).



Figs. 25-26 - Habitus of: 25: *P. beneshi*; 26: *P. subtilissimus*.

***Pterostichus (Circinatus) beneshi* n. sp.**

Diagnosis

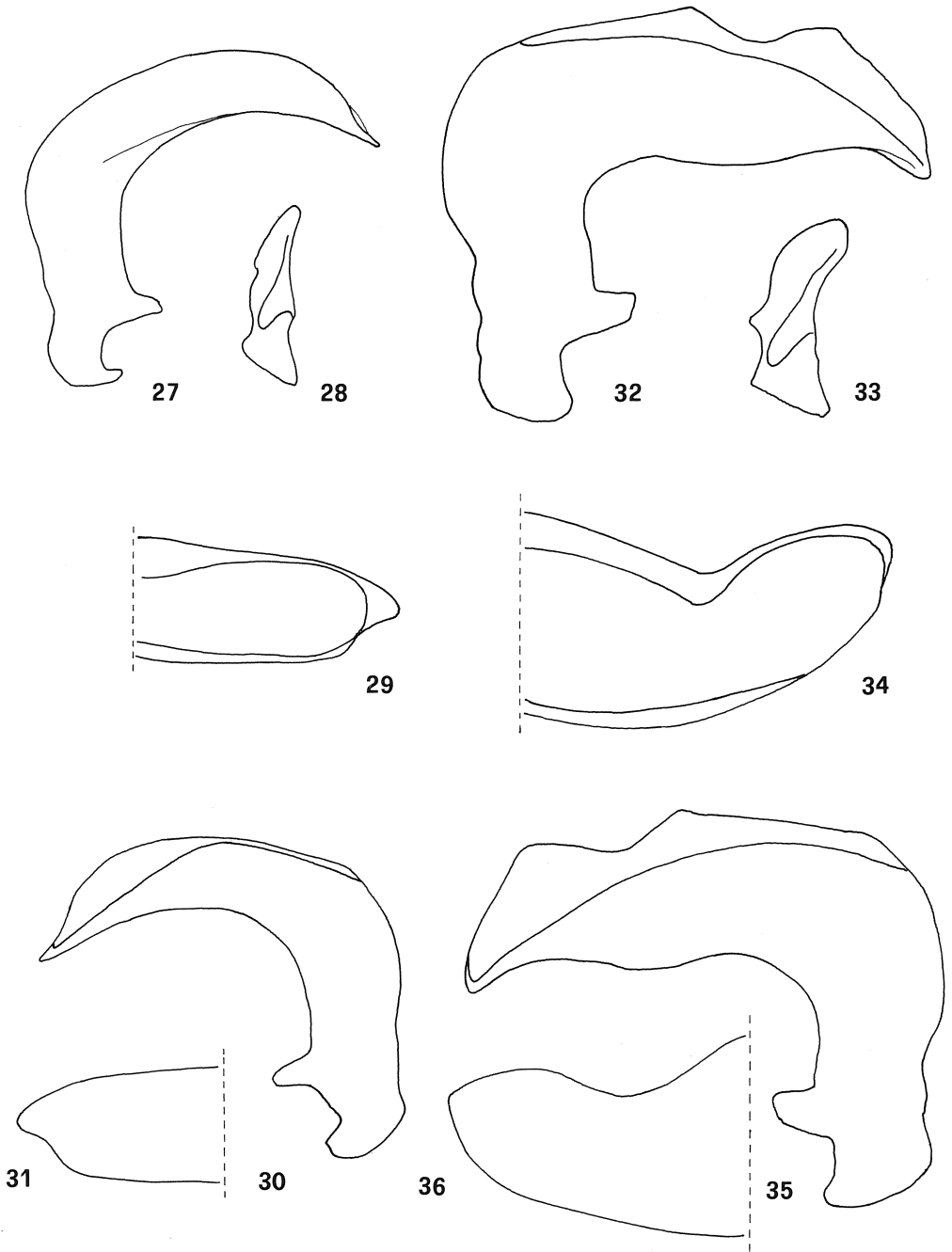
A *Pterostichus (Circinatus)* of medium size (mm 10.1-11.9), related to *P. zoi* but different in its wider pronotum and elytra (figs. 27-31).

Type-locality: China, Sichuan, Wolong, 150 km NW of Chengdu.

Type series: Holotypus ♂: (CS); 1 paratype ♀ from Wolong, Wuypeg 2650 m (CV).

Derivatio nominis

This species is dedicated to my friend Vladimir Beneš, who has often offered me the material of Carabidae collected by him during his travels.



Figs. 27-36 - Aedeagus in left lateral (27), dorsal (29), right lateral (30) and ventral (31) view and right paramere (28) of *P. beneshi*; aedeagus in left lateral (32), dorsal (34), right lateral (35) and ventral (36) view and right paramere (33) of *P. subtilissimus*.

Description

Size mm 10.1-11.9; body and appendages black, palpi, antennae, tarsi and knees reddish-brown. Habitus as in fig. 25.

Head elongate, smooth, much narrower than pronotum; eyes feebly convex. Tempora long and oblique, collar constriction evident but not very deep.

Pronotum long, strongly transverse, constricted in the basal half. Fore angles not projecting forward, hind angles largely rounded. Lateral gutter narrow all along its development; base weakly concave. Basal impressions single, long, rounded, impunctate and smooth. Index width pronotum/length pronotum = 1.15, index length elytra/length pronotum = 2.24, index width elytra/width pronotum = 1.17.

Elytra narrow (index length/width = 1.67) and convex, weakly dilated in the middle; striae deep and strongly punctate; intervals weakly convex. Third interval with two setigerous punctures in the apical half, adjoining stria 2, the anterior just after the middle, the posterior at three-quarters of the elytral length. Shoulders rounded, the basal margin forming a largely obtuse angle with the lateral one. Umbilicate series composed by 6+1+9 setigerous punctures.

Legs long and slender; onychium without setae underneath.

Aedeagus long, with ostium almost dorsal in position. Prebasal portion strongly concave, apex simple, rectilinear in lateral view (figs. 27, 30), in dorsal view with a small apical lamella (fig. 29); internal sac not visible in ventral view (fig. 31). Right paramere relatively short and almost straight, slightly pointed at tip (fig. 28).

Affinities

This species is strictly allied to *P. zoi*, from which can be distinguished through the wider pronotum and elytra and the different shape of the aedeagal apex.

Distribution

Although the area of Wolong has been often explored for entomological purposes, the only specimens known for this species are two, captured in different occasions by different peoples. This locality often provides species different from those of the surrounding areas, although frequently related to other species from west Sichuan.

***Pterostichus (Circinatus) subtilissimus* n. sp.**

Diagnosis

A *Pterostichus (Circinatus)* of large size (15 mm), different from all other species in much larger size, narrower pronotum and elytra and different median lobe of aedeagus (figs. 32-36).

Type-locality: China, Sichuan, Emei Shan.

Type series: Holotypus ♂: (CS).

Derivatio nominis

The name of this species alludes to its very narrow shape of the body, the narrowest within the subgenus.

Description

Size mm 15; body and appendages black, palpi, antennae, tarsi and knees reddish-brown. Habitus as in fig. 26.

Head elongate, smooth, much narrower than pronotum; eyes feebly convex. Tempora long and obliquous, collar constriction evident but not very deep.

Pronotum long, hardly transverse, constricted in the basal half. Fore angles not projecting forward, hind angles largely rounded. Lateral gutter narrow all along its development; base weakly concave. Basal impression single, long, rounded, impunctate. Index width pronotum/length pronotum = 1.07, index length elytra/length pronotum = 2.48, index width elytra/width pronotum = 1.27.

Elytra narrow (index length/width = 1.76) and convex, weakly dilated in apical half; striae deep and strongly punctate; intervals weakly convex. Third interval with two setigerous punctures in the apical half, adjoining stria 3, the anterior just after the middle, the posterior at three-quarters of the elytral length. Shoulders rounded, the basal margin forming a largely obtuse angle with the lateral one. Umbilicate series composed by 7+1+9 setigerous punctures.

Legs long and slender; onychium without setae underneath.

Aedeagus long, with ostium almost dorsal in position. Prebasal portion strongly concave, apex simple, bent downwards at tip in lateral view (figs. 32, 35), strongly bent to the right and constricted after middle in dorsal view, with very small apical lamella (fig. 34); internal sac not visible in ventral view (fig. 36). Right paramere relatively short and almost straight, neither dilated nor pointed at tip (fig. 33).

Affinities

This species looks very isolated both in overall shape of the body and aedeagal shape. The body is larger and thinner than in all other known species, while the aedeagus is strongly bent to the right (in dorsal view) and constricted after middle. It is not obvious to find what other species is the most strictly related to this one, probably its systematic position is rather isolated within the subgenus.

Distribution

The type-locality of this species, Emei Shan, is the same as for *P. zoiài*. The two species are very distinct both in external aspect and shape of aedeagus. This is the first case

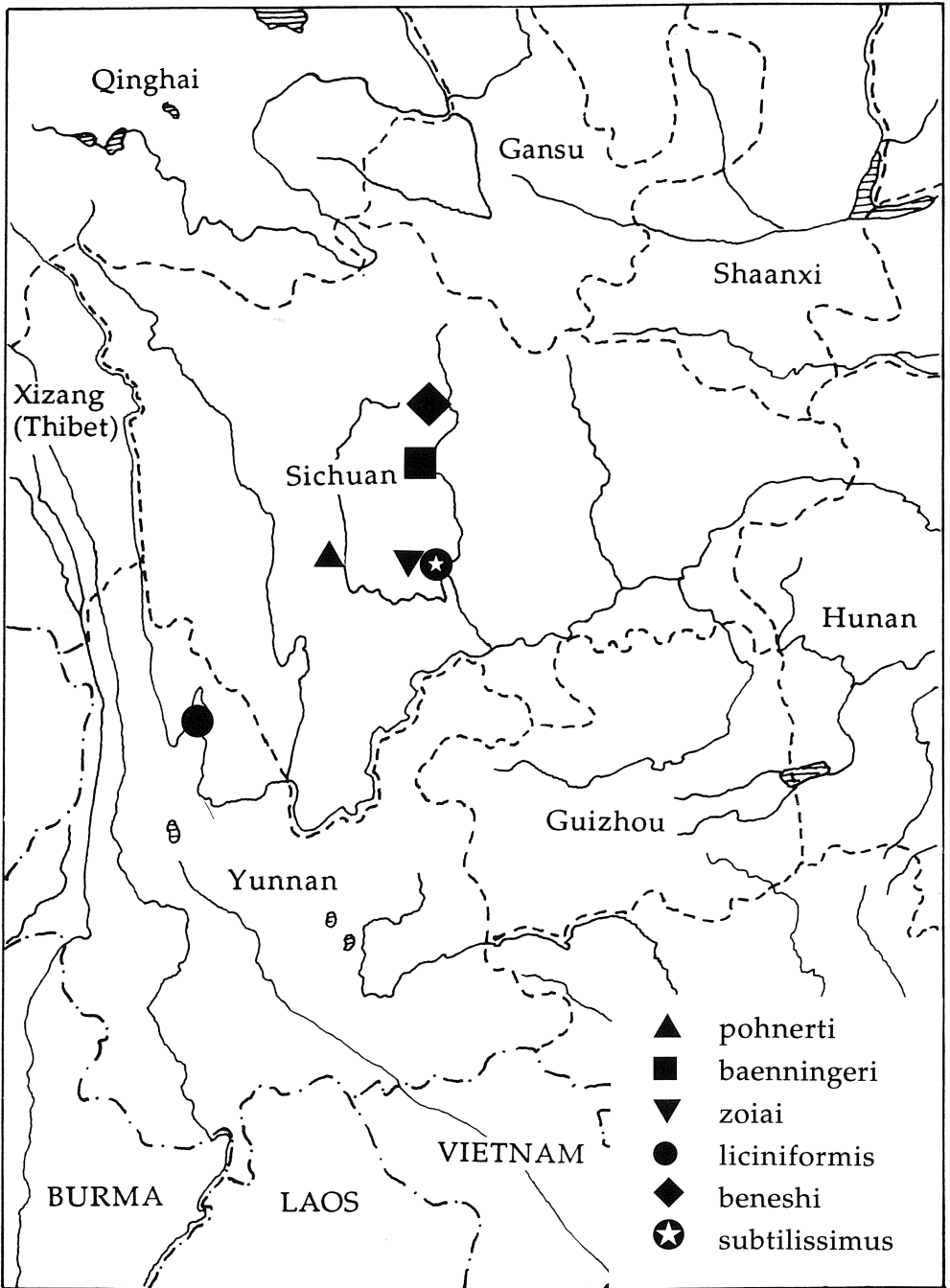


Fig. 37 - Distribution map of the species of *Circinatus*.

known of sympatry among species of this subgenus, although in other subgenera diffused in the same geographic area different species are frequently found in sympatry and even in strict syntopy.

GENERAL DISCUSSION

The species here included in the new subgenus are six; five of them have been found in different localities of western Sichuan, the last one lives in northern Yunnan. Similarly to what has been noticed in the subgenera *Morphohaptoderus* Tschitscherine, 1898 and *Sino-steropus* Sciaky, 1994, the six species of *Circinatus* are apparently very similar to each other in external characters (except one species, more clearly differentiated), but strongly different in the aedeagical structure. In any case, it has not been possible to find any clear relationship between it and any of the many known subgenera of *Pterostichus*.

Key to the species of *Circinatus*

1. Basal margin of elytra meeting the lateral margin with an obtuse angle or a narrow curve; elytral gutter narrow. Sichuan 2.
 – Basal margin of elytra meeting the lateral margin with a wide curve; elytral gutter wide and explanate. Yunnan *liciniformis*
2. Size large (15 mm); pronotum hardly transverse (index width/length = 1.07). Sichuan: Emei Shan *subtilissimus*
 – Size smaller (less than 12 mm); pronotum strongly transverse (index width/length > 1.12)
3. Onychium with some couples of hairs underneath. Sichuan: Chongqing ... *baenningeri*
 – Onychium glabrous underneath 4.
4. Humeral angle with a small but acute tooth. Sichuan: Gongga Shan *pohnerti*
 – Humeral angle without tooth 5.
5. Pronotum wider in comparison to elytra (index width elytra/width pronotum = 1.17). Sichuan: Balang Shan *beneshi*
 – Pronotum narrower in comparison to elytra (index width elytra/width pronotum = 1.21). Sichuan: Emei Shan *zoiai*

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