EIGHTY-YEAR RESEARCH OF PHLEBOTOMINE SANDFLIES (DIPTERA: PSYCHODIDAE) IN CHINA (1915-1995).

I. TAXONOMY AND ZOOGEOGRAPHICAL DISTRIBUTION

LENG Y.J.*

Summary :

County-wide surveys for phlebotomine sandflies were made during the past 80 years in China and a total of 43 confirmed species were identified including one most primitive living fossil genus – *Chinius* – and 5 incriminated vectors of leishmaniasis. These works were mainly carried out by the author and his colleagues. In the first part of this paper the taxonomy and zoogeographical distribution of Chinese species are given.

KEY WORDS : Phlebotomine sandfly, taxonomy, distribution, China, leishmaniasis.

Résumé : 80 ANS DE RECHERCHE SUR LES PHLÉBOTOMES (DIPTERA : PSYCHODIDAE) EN CHINE (1915-1995). I – TAXONOMIE ET RÉPARTITION GÉOGRAPHIQUE

Les études régionales effectuées en Chine au cours des 80 dernières années ont permis d'identifier 43 espèces confirmées, dont un genre considéré comme fossile – *Chinius* – et 5 vecteurs incriminés dans la leishmaniose. La plupart de ces travaux ont été menés par l'auteur et son équipe. Dans la première partie de cet article sont décrites la taxonomie et la distribution géographique des espèces chinoises.

MOTS CLÉS : Phlébotomes, taxonomie, distribution, Chine, leishmaniose.

The Chinese phlebotomine sandflies (PS) have been studied since the early part of this century. A physician of Tsinghua College, R.A. Bolt (1915), reported this tiny insect from his campus in the vicinity of Beijing and a survey made by him based upon the materials from Christian Missionary Hospitals over China and Korea. His specimens collected from Wofesi (Lying Buddha Temple) in west suburb, Beijing was named *Phlebotomus major chinensis* by Newstead (1916) and adapted to *P. chinensis* by Sinton (1928) which was later proved to be a vector of visceral leishmaniasis (VL) in China. Apart from some local endemic area scattered in the northwestern Sichuan and northern Hubei, VL had been known to occur in epidemic form in North, Northeast, East and Northwest China mainly along the Huanghe (Yellow) River, the birth place of China's ancient culture and the north of Changjiang (Yangtze) River. It covered an area about 1,200,000 square km and epidemicity was about 1-5 per thousand and 530,000 cases were estimated to occur. Therefore VL had been one of the main parasitic diseases both in China and the world.

Much has been changed after these eighty years. An active study and control of Chinese VL and its vector

PS were carried out from 50's to 60's through thousands of scientists, doctors and paramedicals under the organization of People's Government; and it seems to be a real prospect of eradicating VL from large areas of China (Wang & Wu 1956; Wang *et al.*, 1983). But during and after the political catastrophe occurred from 60's to 70's, the system of control and prevention suffered a severe setback. This disease and the vector seem to reappear in the area where VL had been considered to be eradicated (Cross *et al.*, 1985; Yan, 1988; Yan *et al.*, 1989a, 1993; Yu *et al.*, 1992). Nevertheless, Chinese VL still exists along the Old Silk Road from Xinjiang eastwards via Gansu, Shaanxi to eastern Inner Mongolia in a sporadic form and some local foci are found in northwestern Sichuan and northern Hubei; but as a fact the risk of recurrence exists, and new type of lymph gland leishmaniasis in Gansu (Zhong *et al.*, 1982) and cutaneous leishmaniasis (CL) in Xinjiang (Xu *et al.*, 1989) and native case of CL in Taiwan (Cross *et al.*, 1985a) have been divided into two species, *Le. donovani s.l.* and *Le. infantum* (Xu *et al.*, 1984; New & Leng, 1985). It is considered that VL was widely epidemic in the old VL area being caused by *Le. donovani s.l.* and VL still exists along the Old Silk Road being caused by *Le. infantum*. Four more PS other than *P. chinensis* are incriminated as the vectors of VL, *P. alexandri*, *P. longiductus*, *P. sichuanensis* and *P. smirnovi* (syn. *P. wui*). The author reviewed Chinese VL 1949-1959 (Leng, 1982) and 1960-1986

* Department of Medical Parasitology, Jinan Faculty of Medicine, University, Guangzhou, 510632 China PR.
Tel. 86-20-8551-6511 ext. 4653/4629
e-mail: oyxy@maina.jnu.edu.cn

(Leng, 1988) and PS research in China 1915-1987 (Leng, 1988). An all round survey of PS over China including three metropolises, 27 provinces and autonomous regions and Hong-Kong, Macau has been carried out and about 44 species have been confirmed, including a living fossil primitive fly genus *Chinius* Leng, 1987. Many works on ecology, taxonomy, evolution, relation to disease transmission and control have been carried out during these eighty years.

SOME ABBREVIATIONS IN TEXT

CL	= Cutaneous Leishmaniasis
Eng. abstr.	= English abstract
FMJNU	= Department of Medical Parasitology, Faculty of Medicine, Jinan University, Guangzhou, 510632 China PR
GYMC	= Department of Parasitology, Guiyang Medical College, 4 Beijing Road, Guiyang, Guizhou Province, 550004 China, PR
LSTM	= Liverpool School of Tropical Medicine, Pembroke Place, Liverpool, L3 5QA United Kingdom
NHML	= Department of Entomology, Natural History Museum, Cromwell Road, London SW7 5BD United Kingdom
PS	= Phlebotomine Sandfly
SDIPD	= Shandong Institute of Parasitic diseases, 13 Middle Taibai Road, Jining, Shandong Province, 272133 China, PR
SIPD	= Shanghai Institute of Parasitic Diseases, Chinese Academy of Medical Sciences, 207 Ruijin 2nd Road, Shanghai, 200025 China, PR
VL	= Visceral Leishmaniasis
ZUMS	= Department of Parasitology, Zhongshan University of Medical Sciences, Zhongshan 2nd Road, Guangzhou, 510089 China, PR

Part I is written mainly from the papers of Leng & Zhang (1991, 1993). To complete the features for the taxonomy of Chinese PS, their corresponding references are given and the following published and communication materials are included: 1. Regular periodicals and books in later years; 2. Unpublished PS survey made by Anti-epidemic Stations in different level; 3. PS survey published in University Bulletin for postgraduates; 4. Annual reports from Institutes; 5. (*Epidemiology and Medical Animals of China*) edited by the Department of Military Health, published by General Logistics Department, PLA, Beijing in 1979. For correctness, the name of places is revised with geographical dictionaries edited by the Bureau of National Territory.

(.) : Number of towns, counties and cities where the species is distributed in one province, metropolis, autonomous region or special area.

[.] : Number of towns, counties and cities where the species is distributed in China.

{.} : Number of provinces, metropolises, autonomous regions and/or special area where one species is distributed.

A. GENUS *CHINIUS* LENG, 1987

[Leng, YJ: *Ann. Trop. Med. Parasitol.*, 1987a, 81(3):331-337]

Only one cave dwelling species known: *Chinius junlianensis*.

Holotype & Paratypes: FMJNU & NHML

Taxonomy: *Chinius* has a broad rounded wing and its shape and venation show a close similarity to the fossil fly *Phlebotomites brevifilis* Hennig, 1972 from Lebanese amber 120 million years old, and somewhat resembles another fossil fly *Phlebotomus tipuliformis* Meunier, 1905 from Baltic amber of 30 million years old. After the comparison with American phlebotomine Genus *Warileya*, Leng (1988a) suggested that the Old World and New World phlebotomus were evolved from a same origin *Phlebotomites*, *Chinius* morphologically appears to be the most primitive sandfly described, which probably has the shortest labrum among PS, and it is suggested that it may attack amphibians and/or reptiles (Leng, 1987a).

1. *C. junlianensis* Leng, 1987 [5] {4}

Holotype & Paratypes: FMJNU & NHML

Distribution: Northwest at Junlian (28.1°N, 104.5°E), Sichuan; Southeastern at Yangshan (24.4°N, 112.6°E), Guangdong; it covers 5 counties of one autonomous region and three provinces in South and Southwest China limestone mountains. Guangdong: Yangshan; Guangxi: Debao, Lingyun; Guizhou; Qinglong; Sichuan: Junlian.

B. GENUS *GRASSOMYIA* THEODOR, 1958

[Theodor, O: Die Fliegen der Palaearktischen Region, 9c Psychodidae-Phlebotominae, Stuttgart, 1958, p. 47;

Abonnenc & Leger: *Cab. ORSTOM*, 1976, 14:69-78;

Artemiev, MM & Neronov, VM:

Inst. evol. Morph. anim. Ecol., 1984, pp. 28-31;

Leng, YJ: *J. Sci. Med. Jinan Univ.*, 1987, 2:25-29;

Lewis, DJ: *Syst. Zool.*, 1987, 12:165-166]

2. *G. indica* Theodor, 1931 [12] {6}

Chinese Specimen: FMJNU

Distribution: North, Kaifeng (34.7°N), Henan; East Taidong (121.1°E), Taiwan; Southwest, Yaxian (18.2°N, 109.5°E), Hainan, which covers 12 counties and cities of one special zone and 5 provinces. *G. indica* is also found in India, Indonesia, Cambodia, Laos, Malaysia, Nepal, Pakistan and Thailand.

Anhui: Linquan, Taihe; Guangdong: Guangzhou, Zhanjiang; Hainan: Baoting, Lingshui, Yaxian; Henan: Kaifeng; Hong Kong; Taiwan: Gaoxiong, Pingdong, Taidong.

C. GENUS *IDIOPHLEBOTOMUS*

QUATE & FAIRCHILD, 1961

[Quate, LW & Fairchild, GB: *Pacific Insects*, 1961, 3(2):208]

3. *I. longiforceps* Wang, Ku & Yuan, 1974 [8] {4}

[Wang, CS, KU, YM & Yuan, ZC: *Acta Entomol. Sin.*, 1974, 17(3):334-338]

Holotype & Paratypes: GYMC

Distribution: Northeast, Jishou (28.3°N, 109.7°E), Hunan; West, Lùxi (98.5°E), Yunnan; South, Mengla (21.4°N), Yunnan of the Southwest Mountainous Area covering 8 counties in one autonomous region and 3 provinces.

Guangxi: Lingyun; Guizhou: Congjiang; Hunan: Jishou; Yunnan: Lùxi, Mengla, Menglian, Simao, Yingjiang. Southwest Mountainous Region, China seems a place which preserves some primitive PS in the world.

D. GENUS *PHLEBOTOMUS* RONDANI & BERTE, 1840

[Rondani, C: *Ann. Soc. ent. Fr.* 1843, 2(1):263;

Theodor, O: *Bull. Ent. Res.*, 1948, 39(1):96]

a. Subgenus *Adlerius* Nitzulescu, 1931

[Nitzulescu, V: *Ann. Parasit. hum. comp.*, 1931a, 9(3):271-275; Theodor, O: 1948:98; 1958:27; Artemiev, MM & Neronov, VM: *Genus Phlebotomus*, Moscow, 1984: 107-108]

Four species of *Adlerius* have been found in China among which three – *P. chinensis*, *P. longiductus* and *P. sichuanensis* – are incriminated vectors of Chinese VL and a newly found *P. fengi* being considered possibly a potential vector in South China (Leng & Zhang, 1994).

1. Beijing	<i>chinensis</i> (9), <i>mongolensis</i> (7), <i>kbawi</i> (5), <i>squamirostris</i> (4)
2. Tianjin	<i>chinensis</i> (6), <i>mongolensis</i> (2), <i>kbawi</i> (1), <i>squamirostris</i> (1)
3. Shanghai	<i>chinensis</i> (1)
4. Jilin	<i>chinensis</i> (2)
5. Liaoning	<i>chinensis</i> (33), <i>mongolensis</i> (4), <i>kbawi</i> (2), <i>squamirostris</i> (10)
6. Inner Mongolia	<i>chinensis</i> (3), <i>smirnovi</i> (1), <i>alexandri</i> (1), <i>andrejiewi</i> (2), <i>mongolensis</i> (5), <i>sinkiangensis</i> (1)
7. Hebei	<i>chinensis</i> (30), <i>mongolensis</i> (29), <i>kbawi</i> (1), <i>squamirostris</i> (11)
8. Shanxi	<i>chinensis</i> (32), <i>mongolensis</i> (18), <i>kbawi</i> (12), <i>squamirostris</i> (5), <i>sun</i> (3)
9. Shaanxi	<i>chinensis</i> (37)*, <i>stantoni</i> (?), <i>kiangsuensis</i> (1), <i>mongolensis</i> (20), <i>kbawi</i> (14), <i>nankingensis</i> (?), <i>squamirostris</i> (14), <i>sun</i> (2), <i>barraudi</i> (?)
10. Gansu	<i>chinensis</i> (33)*, <i>smirnovi</i> (2), <i>alexandri</i> (3), <i>andrejiewi</i> (1), <i>mongolensis</i> (22), <i>kbawi</i> (5), <i>kolosbanensis</i> (1), <i>squamirostris</i> (7), <i>sinkiangensis</i> (1)
11. Ningxia	<i>chinensis</i> (5), <i>mongolensis</i> (7)
12. Qinghai	<i>chinensis</i> (7)*, <i>mongolensis</i> (5), <i>squamirostris</i> (2)
13. Xinjiang	<i>longiductus</i> (28), <i>smirnovi</i> (21), <i>alexandri</i> (13), <i>andrejiewi</i> (6), <i>caucasicus</i> (7), <i>mongolensis</i> (24), <i>sumbarica</i> (4), <i>sinkiangensis</i> (18), <i>sintoni</i> (5), <i>turfanensis</i> (4)
14. Shandong	<i>chinensis</i> (91), <i>kiangsuensis</i> (3), <i>mongolensis</i> (64), <i>kbawi</i> (9), <i>squamirostris</i> (40)
15. Anhui	<i>indica</i> (2), <i>chinensis</i> (11), <i>kiangsuensis</i> (12), <i>mongolensis</i> (15), <i>anhuiensis</i> (5), <i>malayensis</i> (1), <i>nankiangensis</i> (2), <i>squamirostris</i> (14), <i>barraudi</i> (8)
16. Jiangsu	<i>chinensis</i> (22), <i>kiangsuensis</i> (12), <i>mongolensis</i> (17), <i>barraudi</i> (1), <i>nankingensis</i> (1), <i>squamirostris</i> (13)
17. Zhejiang	<i>chinensis</i> (2), <i>kiangsuensis</i> (3), <i>mongolensis</i> (1), <i>anhuiensis</i> (1), <i>squamirostris</i> (3), <i>zhong</i> (2), <i>barraudi</i> (2)
18. Fujian	<i>stantoni</i> (3), <i>quanzhouensis</i> (2), <i>wuyishanensis</i> (2), <i>barraudi</i> (1), <i>yini</i> (2)
19. Taiwan	<i>indica</i> (3), <i>kiangsuensis</i> (1), <i>malayensis</i> (6), <i>barraudi</i> (3)
20. Jiangxi	<i>anhuiensis</i> (1), <i>squamirostris</i> (2), <i>yao</i> (1), <i>zhengjiani</i> (2), <i>barraudi</i> (3)
21. Henan	<i>indica</i> (1), <i>chinensis</i> (35), <i>kiangsuensis</i> (4), <i>mongolensis</i> (28), <i>kbawi</i> (4), <i>squamirostris</i> (8)
22. Hubei	<i>chinensis</i> (7), <i>kiangsuensis</i> (2), <i>mongolensis</i> (1), <i>anhuiensis</i> (1), <i>kolosbanensis</i> (2), <i>nankingensis</i> (1), <i>squamirostris</i> (6), <i>zhengjiani</i> (3), <i>barraudi</i> (3)
23. Hunan	<i>longiforceps</i> (1), <i>chinensis</i> (1), <i>tumenensis</i> (1), <i>barraudi</i> (1)
24. Guangdong	<i>junlianensis</i> (1), <i>indica</i> (2), <i>chinensis</i> (1), <i>stantoni</i> (2), <i>kiangsuensis</i> (4), <i>tumenensis</i> (2), <i>iyengari</i> (1), <i>malayensis</i> (2), <i>barraudi</i> (1), <i>kwangsiensis</i> (2), <i>baili</i> (1), <i>campester</i> (1)
25. Hong Kong	<i>indica</i> , <i>barraudi</i>
26. Macao	<i>barraudi</i>
27. Hainan	<i>indica</i> (3), <i>chinensis</i> (1), <i>stantoni</i> (3), <i>iyengari</i> (1), <i>malayensis</i> (4), <i>barraudi</i> (2), <i>kwangsiensis</i> (2), <i>baili</i> (2), <i>campester</i> (15), <i>fanglianensis</i> (1)
28. Guangxi	<i>junlianensis</i> (2), <i>longiforceps</i> (1), <i>stantoni</i> (1), <i>kiangsuensis</i> (4), <i>lengi</i> (10), <i>tumenensis</i> (1), <i>yunshengensis</i> (2), <i>anhuiensis</i> (1), <i>kolosbanensis</i> (3), <i>barraudi</i> (4), <i>kwangsiensis</i> (2), <i>poo</i> (1)
29. Sichuan	<i>junlianensis</i> (1), <i>chinensis</i> (17)*, <i>sichuanensis</i> (13), <i>stantoni</i> (2), <i>kiangsuensis</i> (3), <i>tumenensis</i> (8), <i>yunshengensis</i> (2), <i>kolosbanensis</i> (16), <i>squamirostris</i> (9), <i>zhengjiani</i> (6), <i>barraudi</i> (20), <i>yini</i> (1), <i>baili</i> (10), <i>campester</i> (2), <i>sun</i> (2)
30. Guizhou	<i>junlianensis</i> (1), <i>longiforceps</i> (1), <i>chinensis</i> (3)*, <i>kiangsuensis</i> (7), <i>tumenensis</i> (1), <i>yunshengensis</i> (1), <i>kbawi</i> (1), <i>kolosbanensis</i> (3), <i>barraudi</i> (1)
31. Yunnan	<i>longiforceps</i> (5), <i>chinensis</i> (3)*, <i>fengi</i> (1), <i>sichuanensis</i> (1), <i>stantoni</i> (4), <i>kiangsuensis</i> (8), <i>lengi</i> (7), <i>tumenensis</i> (2), <i>yunshengensis</i> (1), <i>iyengari</i> (1), <i>kbawi</i> (1), <i>kolosbanensis</i> (8), <i>kueichenae</i> (1), <i>zhengjiani</i> (3), <i>barraudi</i> (8), <i>rudnicki</i> (2), <i>baili</i> (2), <i>campester</i> (2), <i>yunnanensis</i> (1)
32. Tibet (Xizang)	<i>sichuanensis</i> (1)

() = the number of counties and towns where this fly was collected.

* including the old materials in which some *sichuanensis* may be mixed in.

Table I. — Phlebotomine sandflies in different provinces, metropolis, autonomous regions and special zones.

Species	PMAS	C & T
1. <i>C. junlianensis</i>	Guangdong, Guangxi, Guizhou, Sichuan	5
2. <i>G. indica</i>	Anhui, Guangdong, Hainan, Henan, Hong Kong, Taiwan	12
3. <i>I. longiforceps</i>	Guangxi, Guizhou, Henan, Yunnan	8
4. <i>P. chinensis</i>	Anhui, Beijing, Gansu, Guangdong, Guizhou, Hainan, Hebei, Henan, Hubei, Hunan, Inner Mongolia, Jiangsu, Jilin, Liaoning, Ningxia, Qinghai, Shaanxi, Shandong, Shanghai, Shanxi, Sichuan, Tianjin, Yunnan, Zhejiang	392
5. <i>P. fengi</i>	Yunnan	1
6. <i>P. longiductus</i>	Xinjiang	28
7. <i>P. sichuanensis</i>	Sichuan, Tibet, Yunnan	15
8. <i>P. stantoni</i>	Fujian, Guangdong, Guangxi, Hainan, Shaanxi, Sichuan, Yunnan	15
9. <i>P. kiangsuensis</i>	Anhui, Guangdong, Guangxi, Guizhou, Henan, Hubei, Jiangsu, Shaanxi, Shandong, Sichuan, Taiwan, Yunnan	64
10. <i>P. lengi</i>	Guangxi, Yunnan	8
11. <i>P. tumenensis</i>	Guangdong, Guangxi, Guizhou, Henan, Sichuan, Yunnan	15
12. <i>P. yunshengensis</i>	Guangxi, Guizhou, Sichuan, Yunnan	6
13. <i>P. smirnovi</i>	Gansu, Inner Mongolia, Xinjiang	24
14. <i>P. alexandri</i>	Gansu, Inner Mongolia, Xinjiang	17
15. <i>P. andrejiewi</i>	Gansu, Inner Mongolia, Xinjiang	9
16. <i>P. caucasicus</i>	Xinjiang	7
17. <i>P. mongolensis</i>	Anhui, Beijing, Gansu, Hebei, Henan, Hubei, Inner Mongolia, Jiangsu, Liaoning, Ningxia, Qinghai, Shaanxi, Shandong, Shanxi, Tianjin, Xinjiang, Zhejiang	269
18. <i>S. anhuiensis</i>	Anhui, Hubei, Jiangxi, Guangxi, Zhejiang	9
19. <i>S. iyengari</i>	Guangdong, Hainan, Yunnan	3
20. <i>S. kbawi</i>	Beijing, Gansu, Guizhou, Hebei, Henan, Liaoning, Shaanxi, Shandong, Shanxi, Tianjin, Yunnan	55
21. <i>S. kolosbanensis</i>	Gansu, Guangxi, Guizhou, Hubei, Sichuan, Yunnan	33
22. <i>S. kueichenae</i>	Yunnan	1
23. <i>S. malayensis</i>	Anhui, Guangdong, Hainan, Taiwan	13
24. <i>S. nankingensis</i>	Anhui, Hubei, Jiangsu, Shaanxi	4
25. <i>S. quanzhouensis</i>	Fujian	2
26. <i>S. squamirostris</i>	Anhui, Beijing, Gansu, Hebei, Henan, Hubei, Jiangsu, Jiangxi, Liaoning, Qinghai, Shaanxi, Shandong, Shanghai, Shanxi, Tianjin, Zhejiang	141
27. <i>S. wuyishanensis</i>	Fujian	2
28. <i>S. yaoi</i>	Jiangxi	1
29. <i>S. zhengjiani</i>	Hubei, Jiangxi, Sichuan, Yunnan	14
30. <i>S. zhongji</i>	Zhejiang	2
31. <i>S. barraudi</i>	Anhui, Fujian, Guizhou, Guangdong, Guangxi, Hainan, Hong Kong, Hubei, Hunan, Jiangsu, Jiangxi, Macau, Shaanxi, Sichuan, Taiwan, Yunnan, Zhejiang	60
32. <i>S. kuangsiensis</i>	Guangdong, Guangxi, Hainan	6
33. <i>S. rudnicki</i>	Yunnan	2
34. <i>S. sumbarica</i>	Xinjiang	4
35. <i>S. yini</i>	Fujian, Sichuan	3
36. <i>S. sinkiangensis</i>	Gansu, Inner Mongolia, Xinjiang	20
37. <i>S. sintoni</i>	Xinjiang	5
38. <i>S. bailyi</i>	Guangdong, Hainan, Sichuan, Yunnan	15
39. <i>S. campester</i>	Guangdong, Hainan, Sichuan, Yunnan	20
40. <i>S. fanglianensis</i>	Hainan	1
41. <i>S. yunnanensis</i>	Yunnan	1
42. <i>S. pooi</i>	Guangxi	1
*43. <i>S. suni</i>	Shaanxi, Shanxi, Sichuan	7
# 44. <i>S. turfanensis</i>	Xinjiang	4

* may be a synonym of *S. zhengjiani*.

may be a new record of China instead of a new species – *S. turfanensis*, needs further confirmation.

PMAS: Province, Metropolis, Autonomous Region & Special Zone.

C & T: County & Town.

Table II. – Species and distribution.

4. *P. chinensis* Newstead, 1916 [392] {24}

[Newstead, R.: *Bull. Ent. Res.*, 1916, 7(2), 191-192; Nitzulescu, V: *Ann. Parasitol. hum. comp.*, 1931, 9(3), 261-265; Sinton, JA : *Ind. J. Med. Res.*, 1928, 16(2):306-307]

Holotype & Paratypes: NHML

Distribution: Northeast, Jilin (43.8°N, 126.5°E), Jilin Province; Northwest, Dunhuang, (40.1°N, 94.6°E), Gansu along Hexi Corridor, the well irrigated part of Old Silk Road; West, Lixian (103.1°E), Sichuan; Southwest, Hekou (22.4°N, 103.9°E) and Kunming (25°N, 102.7°E), Yunnan; Southeast, Nada (19.5°N, 109.5°E), Hainan.

P. chinensis is the most important vector of VL and most widely distributed sandfly, but mainly in the north of Changjiang (Yangtze) River and the northeastern quadrant in the lowest flight of the three China's land-steps. The footprints of this fly has been found in 392 towns, counties and cities of 24 provinces, autonomous regions and metropolises.

Line from north to south in the eastern Qinghai, southern Gansu and western Sichuan with its affinity species *P. sichuanensis*.

Anhui: Boxian, Chuxian, Dangshan, Huaiyuan, Linqian, Suixi, Suxian, Taihe, Wuhe, Xiaoxian, Yangshan. (11)

Beijing: Changping, Daxing, Fangshan, Liangxiang, Miyun, Pinggu, Suburb, Tongxian, Yanqing. (9)

Gansu*: Dangchang, Dongxiang, Dunhuang, Gangu, Guanghe, Gaolan, Heshui, Hezheng, Huachi, Huanxian, Jingchuan, Jingyuan, Lanzhou, Lingtai, Linxia, Longxi, Minxian, Ningxian, Pingliang, Qin'an, Qingshui, Qingyang, Tianshui, Tongwei, Wenxian, Wushan, Wudu, Yongdeng, Yongjing, Yuzhong, Zhangye, Zhenning, Zhenyuan. (33)

Guangdong: Lianxian. (1)

Guizhou*: Bijie, Congjiang, Guiyang. (3)

Hainan: Danxian. (1)

Hebei: Anping, Anxin, Baoding, Beidaihe, Chengdong, Dachang, Dingxian, Handan, Laishui, Qianxi, Qinhuangdao, Qinglong, Qingyuan, Qingxian, Quzhou, Raoyang, Sanhe, Shanhaiguan, Tangshan, Tangxian, Weixian, Wen'an, Wuji, Wuqiang, Xinglong, Xiongxin, Xushui, Yixian, Zhaoxian, Zunhua. (30)

Henan: Anyang, Bo'ai, Gongxian, Hebi, Huixian, Jixian, Jiuyan, Kaifeng, Lingbao, Linru, Luoning, Luoyang, Lushi, Mianchi, Mengjin, Mengxian, Ningling, Queshan, Qixian, Qixian (Chaohe), Sanmenxia, Shaanxian, Shangqiu, Suixian, Taikang, Tangyin, Xin'an, Xinyang, Xingyang, Xiuwu, Xunxian, Yanshi, Yichuan, Yiyang, Yuanyang. (35)

Hubei: Jingmen, Lichuan, Shennongjia, Wudangshan, Xiangyang, Yangxin, Zigui. (7)

Hunan: Huayuan. (1)

Inner Mongolia: Alxa Youqi, Kulunqi, Ningchengxian. (3)

Jiangsu: Donghai, Fengxian, Ganyu, Guanyun, Huai'an, Haizhou, Huaiyin, Jiangpu, Lianshui, Lianyungang, Nanjing, Peixian, Pixian, Qingjiang, Sihong, Siyang, Shuyang, Suqian, Tongshan, Xinhailian, Xinyi, Xuzhou. (22)

Jilin: Changchun, Jilin. (2)

Liaoning: Anshan, Beizhen, Benxi, Changhai, Chaoyang, Dalian, Dandong, Donggou, Fengcheng, Fushun, Fuxian,

Fuxin, Gaiping, Huanren, Jianchang, Jinxi, Jinxian, Harqin Zouqi, Kuandian, Liaoyang, Lingyuan, Lüshun (Port Arthur), Qingyuan, Shenyang, Suizhong, Tieling, Xinbin, Xingcheng, Xinjin, Xiongyue, Xiuyan, Yingkou, Zhuanghe. (33)

Ningxia: Guyuan (Pengyang), Haiyuan, Longde, Xiji, Zhongning. (5)

Qinghai*: Guide, Hualong, Jianzha, Ledu, Minhe, Sining, Xunhua. (7)

Shaanxi*: Baihe, Baishui, Baoji, Binxian, Chang'an, Chengcheng, Dali, Fufeng, Fengxiang, Fuping, Ganquan, Hancheng, Heyang, Huanglong, Huashan, Huayin, Jingyang, Lantian, Meixian, Mizhi, Ningshaan, Qianxian, Qianyang, Qishan, Sanyuan, Suide, Tongguan, Weinan, Wuqi, Xi'an, Xingping, Xunyi, Yan'an, Yanchang, Yichuan, Yulin, Zichang (Wayabao). (37)

Shandong: Anqiu, Binxian, Binzhou, Boshan, Boxing, Cangshan, Changle, Changqing, Changshan, Changyi, Dexian, Dezhou, Dingtao, Dongping, Feicheng, Fushan, Gaomi, Guangrao, Guanxian, Haiyang, Heze, Huangxian, Huantai, Huimin, Jiaxiang, Jimi, Jinan, Jining, Jiayang, Juancheng, Juye, Kunyu, Laiyang, Laiwu, Laixi, Leling, Liangshan, Liaocheng, Licheng, Linqi, Linqing, Linyi, Linzi, Muping, Penglai, Pingdu, Pingyin, Pingyuan, Qicun, Qihe, Qixia, Qufu, Rizhao, Rongcheng, Rushan, Shanghe, Shouguan, Shouzhang, Sishui, Tai'an, Tengxian, Tangyi, Weifang, Weihai, Weishan, Weixian, Wendeng, Wudi, Wulian, Wucheng, Xintai, Yanggu, Yangxin, Yanzhou, Yexian, Yidu, Yinan, Yishui, Yixian, Yiyang, Yucheng, Yuncheng, Zanhua, Zhaozhuang, Zhaoyuan, Zhucheng, Zibo, Zichuan, Ziyang, Zouping, Zouxian. (91)

Shanghai: Xuhuiqu. (1)

Shanxi: Daning, Datong, Fanshi, Guangling, Hequ, Hunyuan, Houxian, Jiexiu, Jixian, Kelan, Licheng, Linfen, Lingchuan, Lishi, Liulin, Pingshun, Shilou, Shouyang, Taiyuan, Taigu, Wutai, Wuxiang, Wuzhai, Xiangyuan, Xiaoyi, Xinxian, Yanggao, Yangquan, Yangqu, Yongji, Yuanqu, Yuxian. (32)

Sichuan*: Anxian, Emei, Guanxian, Guangyuan, Heishui, Jinchuan, Junlian, Lixian, Maerkang (Barkam), Maowen, Maoxian, Nanping, Songpan (Sunqu), Wenchuan, Wulong, Xiaojin, Yibin. (17)

Tianjin: Baodi, Jianhai, Jixian, Ninghe, Suburb, Wuqing. (6)

Yunnan*: Hekou, Kunming, Shuangjian. (3)

Zhejiang: Changshan, Tiantai. (2) *

5. *P. fengi* Leng & Zhang, 1994 [1] {1}

[Leng, YJ & Zhang, LM: *Ann. trop. Med. Parasitol.*, 1994, 88(5):523-530]

P. fengi is a newly named *Adlerius* from Longling County (24.5°N, 98.7°E, and 900 m above sea level), Yunnan near to the Sino-Burmese border.

Holotype & Paratypes: FMJNU

Yunnan: Longling.

An autochthonous case of VL in Liujiang County (24.2°N, 109.3°E), Guanxi has been reported. Then, as the other three Chinese *Adlerius*, it is considered that *P. fengi* may also be a potential vector of VL in South China (Leng & Zhang, 1994).

* Including data of the 1950's-1960's, some of which are mixed with *P. sichuanensis* Leng & Yin, 1983.

6. *P. longiductus* Parrot, 1928 [28] {1}

[Parrot, L: *Arch. Inst. Pasteur Alger.*, 1928, 6(1):26-34; Lewis, DJ: *Bull. Brit. Mus. (NH), Ent. Ser.*, 1982, 45(2), 161; Wang, J. *et al.*: *J. Epidemiol.*, 1966, 4(1):30-32]

Chinese Specimen: SIPD

Distribution: *P. longiductus* is only found in Xinjiang. North, Tacheng (46.7°N); East, Hami (93.4°E); South, Yecheng (37.8°N); West, Akto (75.9°E). It opens to west in Afghanistan, India, Pakistan, Romania, Kazakhstan and Uzbekistan.

Xinjiang: Aksu, Akto, Anjihai, Artux, Changji, Emin, Hami, Kalpin, Kashi (Kaxgar), Kuqa, Qitai, Shache, Shanshan, Shufu, Shule, Tacheng, Tekes, Toksun, Turpan, Urumqi, Usu, Wensu, Wushi, Xinyuan, Yecheng, Yining, Yopurga, Yumin. (28)

P. longiductus is proved to be a vector of VL in China and Central Asia. The infection rate after experimental feeding is about 54.2 % in Xinjiang (Xiong *et al.*, 1974).

7. *P. sichuanensis* Leng & Yin, 1983 [15] {3}

[Leng, YJ & Yin, ZC: *Ann. Trop. Med. Parasitol.*, 1983, 77(4), 423-426]

Holotype & Paratypes: FMJNU & NHML

Distribution: North, Nanping (33.2°N), Sichuan; East, Guangyuan (105.8°E), Sichuan; South, Huize (26.4°N), Yunnan; West, Co Nag (92°E), Tibet. *P. sichuanensis* is a high mountainous species distributed in the southwest quadrant of the highest flight of three land-steps of China.

Sichuan: Anxian, Guangyuan, Heishui, Jinchuan, Junlian, Lixian, Maerkang (Barkam), Maowen, Nanping, Songpan (Sunqu), Wenchuan, Xiaojin, Yibin. (13)

Xizang (Tibet): Co Nag (Cona, Lexiang). (1)

Yunnan: Huize. (1)

P. sichuanensis is the only PS found in Tibet and being incriminated a vector of VL in Northwest Sichuan with an artificial infection rate of 60.8 % for local *Leishmania* (Yin, Leng *et al.*, 1985) and probably a vector in southern Gansu and eastern Qinghai.

The old surveying material of *P. chinensis* included in this paper from Gansu, Guizhou, Qinghai and Yunnan and some from Sichuan may be mixed with *P. sichuanensis* which has been named after those surveys.

P. sichuanensis and *P. chinensis* have been well studied comparatively with life-history, hybridization analysis, isozyme characterization, morphostructural and morphometric characteristics, geographical distribution and relation to disease transmission (Leng & Zhang, 1992). These two flies are isolated species.

b. Subgenus *Anaplebotomus* Theodor, 1948

[Theodor, O: 1948:3(1):99, 1958:19; Lewis, DJ: 1982:171-172]

8. *P. stantoni* Newstead, 1914 [15] {7}

[Newstead, R: *Bull. Ent. Res.*, 1914, 5:179-192; Raynal, J & Gaschen H: *Bull. Soc. Path. Exot.*, 1934b, 27(7):670-675; Leng, YJ & Zhang, LM: *Ann. Trop. Med. Parasitol.*, 1993, 87(1):89]

It is the only one species of *Anaplebotomus* – *P. stantoni* confirmed in China after *P. boepplii* was synonymized by Lewis (1987).

Synonym: *P. boepplii* Tang & Maa, 1945

[Tang & Maa: *Res. Bull. Fukien Acad.*, 1945, 1:241-245. Male and female, holotype male]

Chinese Specimen: FMJNU & SIPD

Distribution: North, Nanping (29.1°N), Sichuan; East, Jia-nyang (118.1°E), Fujian; South, Yaxian (18.2°N), Hainan; West, Luxi (Mangshi, 98.5°E), Yunnan covering 15 towns and counties of one autonomous region and 3 provinces in South – and Southwest China. In the south it opens to Indian Subcontinent including Sri Lanka and Southeast Asian countries – West Malaysia, Thailand, Laos, Vietnam and Indonesia (Java).

Fujian: Jianyang, Shaowu, Yongan. (3)

Guangdong: Guangzhou, Zhanjiang. (2)

Guangxi: Lingyun. (1)

Hainan: Baoting, Wenchang, Yaxian. (3)

Shaanxi: county unknown.

Sichuan: Junlian, Nanping. (2)

Yunnan: Luxi (Mangshi), Menglian, Simao, Yuanjiang. (4).

c. Subgenus *Eupplebotomus* Theodor, 1948

[Theodor, O: 1948:89-99]

Four species are treated belonging to *Eupplebotomus*. They are all cave dwellers where rodents, bats and birds are the common inhabitants. The author had been actively attacked by *P. kiangsuensis* and *P. yunshengensis* in limestone caves for many times with severe itching. The discovered Chinese *Eupplebotomus* are all in the south of Changjiang River and except *P. kiangsuensis* the other three are distributed mainly in the South and Southwest mountainous area.

Taxonomy: Leng & Lewis (1987) stated that in the subgenus *Eupplebotomus*, *P. tumenensis* and *P. yunshengensis* are the only species with a negative *pi* in venation and with the distal segment of the spermatheca bulbous and longer than the rest combined. The wing shape and venation (negative *pi* and positive *delta*) of *P. yunshengensis* are rather similar to those of the Afrotropical subgenus *Spelaopplebotomus* Theodor, 1948. In the former, however, the distance between the base of R4 and R5 (*gamma*, longer than quarter of wing width, 1/1.7), the spatulate sensilla on palpal segment 3, the long proboscis, A3/L less than 2 (1.7) and the genital pump without adjacent chitinous rods are remarkably different from *Spelaopplebotomus*. Chinese species of *Eupplebotomus* with trilobed parameres and the aedeagus without accessory spines. But the trilobed parameres of *P. lengi* are vestigial. It seems that two Chinese members, *P. tumenensis* and *P. yunshengensis* treated in subgenus "*Eupplebotomus*", should be arranged in a new subgenus.

9. *P. kiangsuensis* Yao & Wu, 1938 [64] {13}

[Yao, YT & Wu, CC: *Chn. med. J. (Suppl. 2)*, 1938:527-537]

Holotype & Paratypes: SIPD

Distribution: North, Tengxian, (35.1°N), Shandong; East, Taiping (121.1°E), Taiwan; West, Baihe (110°E), Shaanxi; Southwest, Yingjiang (26.4°N, 97.9°E) and Mengla (21.4°N, 101.5°E), Yunnan. *P. kiangsuensis* is one common phlebotomine in the south of Huanghe River covering 64 counties and cities of 13 provinces and autonomous regions.

Anhui: Boxian, Funan, Fuyang, Guoyang, Huaiyuan, Linquan, Mengcheng, Sucheng, Suixi, Taihe, Wuhe, Yingshang. (12)

Guangdong: Lianxian, Qujiang, Yangshan, Yingde. (4)
 Guangxi: Debao, Fuchuan, Jingxi, Lingyun. (4)
 Guizhou: Bijie, Ceheng, Congjiang, Liping, Longli, Qinglong, Tongren. (7)
 Henan: Gongxian (Xiaoyi), Kaifeng, Shangqiu, Xinyang. (4)
 Hubei: Jingmen, Xiangyang. (2)
 Jiangsu: Donghai, Ganyu, Huai'an, Huaiyin, Jiangpu, Lianshui, Nanjing, Peixian, Pixian, Xinyi, Xuzhou, Yangzhou. (12)
 Shaanxi: Baihe. (1)
 Shandong: Linyi, Tengxian, Weishan. (3)
 Sichuan: Junlian, Maowen, Wulong. (3)
 Taiwan: Taidong. (1)
 Yunnan: Jinggu, Longling, Lùxi, Mengla, Simao, Wenshan, Yanjin, Yingjiang. (8)
 Zhejiang: Deqing, Yuhang, Zhoushan. (3)

10. ***P. lengi*** Zhang, He & Ward, 1994 [8] [2]
 [Zhang, LM, He, MS & Ward, RD: *Ann. Trop. Med. Parasitol.*, 1994, 88(5):531-537]

Holotype & Paratypes: FMJNU
 Distribution: North, Lùxi (24.5°N), Yunnan; East Lingyun (106.5°E), Guangxi; South, Mengla (21.4°N), Yunnan; West, Menglian (99.5°E), Yunnan. *P. lengi* is distributed in subtropical rain forest of high mountainous area covering 7 counties in Yunnan and one in Guangxi.
 Guangxi: Lingyun. (1)
 Yunnan: Funing, Jinggu, Mengla, Menglian, Lùxi, Simao, Yongde. (7)

11. ***P. tumenensis*** Wang & Chang, 1963 [15] [6]
 [Wang, CT & Chang, YS: *Acta Entomol. Sin.*, 1963, 12(4):511-514]

Holotype & Paratypes: SDIPD
 Distribution: North Maowen (31.6°N), northern Sichuan; East, Yangshan (112.6°E) Guangdong; Southwest, Mengla (21.4°N, 101.5°E), Yunnan covering 15 counties in one autonomous region and 5 provinces.
 Guangdong: Lianxian, Yangshan. (2)
 Guangxi: Lingyun. (1)
 Guizhou: Congjiang. (1)
 Hunan: Lingling. (1)
 Sichuan: Emei, Gaoxian, Junlian, Maowen, Pingshan, Rongxian, Wenchuan, Yibin. (8)
 Yunnan: Funing, Mengla. (2)

12. ***P. yunshengensis*** Leng & Lewis, 1987 [6] [4]
 [Leng, YJ & Lewis DJ: *Ann. Trop. Med. Parasitol.*, 1987, 8(3):305-309]

Holotype & Paratypes: FMJNU & NHML
 Distribution: North, Rongxian (29.4°N, 104.4°E), Sichuan; East, Fuchuan (111.2°E), Guangxi; Southwest, Mengla (21.4°N, 101.5°E), Yunnan covering 6 counties in one autonomous region and 3 provinces.
 Guangxi: Fuchuan, Lingyun. (2)
 Guizhou: Congjiang. (1)
 Sichuan: Junlian, Rongxian. (2)
 Yunnan: Mengla. (1)

d. Subgenus *Larroussius* Nitzulescu, 1931
 [Nitzulescu, V: *Ann. Parasitol. hum. comp.*, 1931a, 9(3):271-275]

Only one species of *Larroussius* is found in China, *P. smirnovi*, which has been proved a vector of Chinese VL.

13. ***P. smirnovi*** Perfiliew, 1941 [24] [3]
 [Perfiliew, PP: *Trudy Voenno-Meditsinskoe Akademii im. SM Kirova*, 1941, 25:272-284; Lewis, DJ, 1982:162-163]

Synonym :

1. *P. major* Ting & Ho, 1962 [Ting, ST & Ho, KT: *Acta Entomol. Sin.*, 1962, 11(4):388-393]
 2. *P. major wui* Yang & Xiong, 1965 [Yang, KY & Xiong, GH: *Acta Parasitol. Sin.*, 1965, 2(4):412-415]
 3. *P. wui* Artemiev & Neronov, 1984 [Artemiev, MM & Neronov VM: 1984:103-105; Xiong, GH & Jin CF: *Chn. J. Parasitol. parasit. Dis.*, 1987, 5(1):45-47]
 Synonymized by Leng, Lane and Lewis [Leng YJ, Lane, RP & Lewis, DJ: *Ann. Bull. Soc. Parasitol.*, Guangdong Province, 1987, 8/9:40-43].

Chinese Specimen: FMJNU, & DIPD

Distribution: North, Tacheng (46.7°N), Xinjiang; East, Ejiaqi (101°E), Inner Mongolia; Southwest, Akto (39.1°N, 75.9°E), Xinjiang, mainly in the desert, semidesert and grassland from Xinjiang to Inner Mongolia north of Kara-Kunlun Mountains and Hexi Corridor where separates *P. smirnovi* from Tibet and the well irrigated parts of Gansu. It covers 24 counties and banners (*qi*) in one province and two autonomous regions. But in the north it opens to Mongolia and in the west to Kazakhstan, Central Asia.

Gansu: Anxi, Dunhuang. (2)

Inner Mongolia: Ejiaqi. (1)

Xinjiang: Akto, Aksu, Artux, Bachu, Hami, Karamay, Kashi (Kaxgar), Keping, Kuqa, Mosuowan, Shanshan, Shayar, Shufu, Shule, Tacheng, Tarim Basin (Upper and Middle Basin-desert), Toksun, Usu, Wensu, Yining, Yupurga. (21)
P. smirnovi was found naturally infected (2.9 %) with *Leishmania* during the sandfly season in Xinjiang epidemic area.

e. Subgenus *Paraphlebotomus* Theodor, 1948

[Theodor, O, 1948:97; 1958:19, Lewis, DJ, 1982:143]

Four species are belonging to *Paraphlebotomus*. Three of them, *P. alexandri*, *P. andrejevi* and *P. caucasicus* are desert, semi-desert and grassland inhabitants.

14. ***P. alexandri*** Sinton, 1928 [17] [3]
 [Sinton, JA: *Ind. J. Med. Res.*, 1928, 16(2):308; Xiong, GH, Wang J., et al.: *Acta Entomol. Sin.*, 1963, 12(4):458-462; Hsiong, KH, Wang, J. & Kuan, LR: *Acta Entomol. Sin.*, 1964, 13(1):141-144]

Chinese Specimen: SIPD

Distribution: North, Jinghe (44.6°N), Xinjiang; East, Alxa Youqi (101.7°E), Inner Mongolia; Southwest, Shufu (39.4°N, 75.8°E), Xinjiang. *P. alexandri* is reported with a wide distribution from Morocco, Northwest Africa and Spain, West Europe via East Europe and Middle East to Central Asia and China, but with many morphological variations.

P. alexandri is proved to be a vector of VL in China with a natural *Leishmania* infection rate of 2.0 % and it has been found on the northern slope of Qilian Mountain Range at about 3,200 m above sea level (39°N, 98°E) near Jiayuguan (39.8°N, 98.2°E) in Gansu (Leng & Zhang, 1991), where probably is the highest living site for PS in the world.

Gansu: Dunhuang, Jiuquan (Heishanhu), Jiayuguan (on the northern slope of Qilianshan Mountain Range near Jiayuguan at 3,200 m above sea level) (3)

Inner Mongolia: Alxa Youqi (in the caves on south slope of Mt. Yablait). (1)

Xinjiang: Artux, Aksu, Jinghe, Kashi (Kaxgar), Kuqa, Shawan, Shayar, Shufu, Turpan Basin, Wensu, Wusu, Yiwu. (13)

15. ***P. andrejevi*** Shakirzyanova, 1953 [9] {3}

[Shakirzyanova, MS: *Trudy Instituta Zoologii Akademii Nauk Kazakhskoe SSR*. 1953, 1:102-107; Guan, LR *et al.*: *Acta Entomotax. Sin.*, 1981, 3(7):28]

Chinese Specimen: SIPD

Distribution: North, Karamay (45.6°N), Xinjiang; Southeast, Wulate Houqi (Oog Ondor, 41.4°N, 107°E), Inner Mongolia; West, Huocheng (80.4°E), Xinjiang covering 7 counties and 2 banners in one province and two autonomous regions. *P. andrejevi* is also in Afghanistan, Mongolia, Kazakhstan and Uzbekistan and is suspected a vector of *Le. major* (*gerbilli*?) in Central Asian countries (Sergieff, 1979). And is a vector of *Le. turanica* and *Le. gerbilli* of great gerbil (*Rhombomys optimus*) in North Xinjiang, China on the basis of natural infection (13.1 %) and experimental transmission (Guan *et al.*, 1994).

Gansu: Minqin. (1)

Inner Mongolia: Ejinaqi, Wulate Houqi. (2)

Xinjiang: Bole, Fukang, Huocheng, Karamay, Mesuowan, Qitai. (6)

16. ***P. caucasicus*** Marzinovsky, 1917 [7] {1}

[Marzinowsky, E: *Meditinskoe Obozrenie*, 1917, 87(13/16):611-614; Xiong, GH *et al.*: *Acta Entomol. Sin.*, 1964, 13(1):141-144]

Chinese Specimen: SIPD

Distribution: Only in Xinjiang. North, Tacheng (46.7°N), Southwest, Urumqi (43.8°N, 87.6°E); West, Huocheng (80.8°E). *P. caucasicus* is also in Afghanistan, Armenia, Azerbaydzhan, Georgia, Kazakhstan and Uzbekistan.

Xinjiang: Emin, Huocheng, Jinghe, Karamay, Tacheng, Urumqi, Yili. (7)

It is considered a vector of VL in Kazakhstan (Sergieff, 1979) and suspected a vector of *Le. major* (*gerbilli*?) among rodents in Central Asia (Killick-Kendrick, 1990).

17. ***P. mongolensis*** Sinton, 1928 [269] {17}

[Sinton, JA: *Ind. J. Med. Res.*, 1928, 16(2):309]

Chinese Specimen: FMJNU & SIPD

Distribution: North, Tacheng (Qoqek, 46.7°N), Xinjiang; East, Gaixian (122.3°E), Liaoning; South, Huzhou (30.8°N), Zhejiang and in the West opens to Afghanistan, Azerbaydzhan, Kazakhstan and Uzbekistan, Central Asia. *P. mongolensis* is a common species spreading in the north of Changjiang River covering 269 towns, counties and cities in 17 provinces, autonomous regions and metropolises. With exception of only one county (Huzhou, 30.8°N, 120.1°E) near the south bank of Changjiang River.

Anhui: Bengbu, Boxian, Dangshan, Fengtai, Guoyang, Huaiyuan, Linqian, Mengcheng, Sixian, Suixi, Suxian, Wuhe, Xiaoxian, Yangshan, Yinshang. (15)

Beijing: Daxing, Changping, Liangxiang, Miyun, Suburb, Tongxian, Yanqing. (7)

Gansu: Anxi, Dongxiang, Dunhuang, Gaolan, Huanxian, Jianyuguan, Jingchuan, Jingyuan, Jinta, Jiuquan (Heishanhu), Lanzhou, Lingtai, Linxia, Minqin, Shandan, Tianshui, Wushan, Wuwei, Zhangye, Zhenyuan, Yongdeng, Yongjing. (22)

Hebei: Anxian, Andong, Anping, Baoding, Dachang, Gaocheng, Guantao, Handan, Huolu, Jinxian, Laishui, Qianxi, Qinglong, Qingyuan, Quzhou, Raoyang, Shahe, Tangxian, Weixian, Wen'an, Wuji, Wuqiang, Xinglong, Xiongqian, Xushui, Yixian, Zaoqiang, Zhaoxian, Zunhua. (29)

Henan: Biyang, Changyuan, Gongxian, Huixian, Huojia, Kaifeng, Lingbao, Linru, Luoyang, Lushi, Mianchi, Mengjin, Mengxian, Ningling, Puyang, Qixian, Shangqiu, Suixian, Taikang, Tangyin, Wenxian, Xin'an, Xunxian, Yanshi, Yiyang, Yichuan, Yuanyang, Zhongmou. (28)

Hubei: Jingmen. (1)

Inner Mongolia: Alxa Youqi, Ejinaqi, Linhexian, Urad Houqi, Jungger Qi. (5)

Jiangsu: Donghai, Fengxian, Ganyu, Huai'an, Huaiyin, Jiangpu, Lianshui, Peixian, Pixian, Shuyang, Suining, Sihong, Siyang, Suqian, Tongshan, Xinyi, Xuzhou. (17)

Liaoning: Gaixian, Jinzhou, Suizhong, Xingcheng. (4)

Ningxia: Guyuan, Helan, Ningxia, Shizhuishan, Wuzhong, Yinchuan, Zhongning. (7)

Qinghai: Ledu, Hualong, Minhe, Xining, Xunhua. (5)

Shaanxi: Baishui, Binxian, Dali, Dingbian, Chengcheng, Fuping, Huanglong, Hancheng, Huayin, Mizhi, Pucheng, Sanyuan, Suide, Weinan, Wuqi, Xi'an, Xiping, Yanchang, Yichuan, Yulin. (20)

Shandong: Binxian, Boxing, Changqing, Changyi, Chiping, Dexian, Dezhou, Dingtao, Dongping, Feicheng, Gaomi, Gaochang, Guangrao, Guanxian, Heze, Huantai, Huimin, Jiayang, Jinan, Jining, Jiningshi, Jinxiang, Jiyang, Juancheng, Juye, Leling, Liangshan, Liaocheng, Licheng, Lijin, Linqing, Linyi, Linzi, Ningjin, Penglai, Pingdu, Pingyin, Pingyuan, Qidong, Qihe, Qingyun, Shanghe, Shouguang, Shouzhang, Tai'an, Tangyi, Tengxian, Weifang, Weishan, Weixian, Wenshang, Wucheng, Wudi, Xiajin, Yanggu, Yanzhou, Yucheng, Zaozhuang, Zhanhua, Zibo, Ziyang, Zouping, Yangxin, Yidu. (64)

Shanxi: Daning, Fanchi, Jiexiu, Jixian, Hequ, Huoxian, Linfen, Lishi, Liulin, Shanyin, Shilou, Taiyuan, Wuxiang, Wuzhai, Xiaoyi, Xinxian, Yangqu, Yongji. (18)

Tianjin: Jinghai, Suburb. (2)

Xinjiang: Akto, Artux, Bole, Changji, Emin, Fukang, Hami, Hoxtologay, Huocheng, Jinghe, Karamay, Kashi (Kaxgar), Mesuowan, Qitai, Shanshan, Tacheng, Toksun, Turpan, Urumqi, Wushi, Usu, Yecheng, Yining, Yumin. (24)

Zhejiang: Huzhou (Wuxing). (1)

P. mongolensis is a vector of rodents leishmaniasis caused by *Leishmania gerbilli* in Turkmenistan (Safjanova, 1967) and in Mongolia (Killick-Kendrick, 1990) on the basis of ecology and natural infection. Natural infection of *Leishmania gerbilli* has been found both in gerbil (*Rhombomys optimus*) and *P. alexandri* and *P. mongolensis* (Wang *et al.*, 1964) and in *P. caucasicus*, and *P. mongolensis* (Xiong *et al.*, 1964; Guan *et al.*, 1994) and in *P. andrejevi* in North Xinjiang, China. These PS are considered to be vectors based upon experimental transmission and natural infection.

E. GENUS *SERGENTOMYIA* FRANCA & PARROT, 1920

[Franca, C & Parrot, L: *Bull. Soc. Path. Exot.*, 1920, 13(8):695-708]

f. Subgenus *Neophlebotomus* Franca & Parrot, 1920

[Theodor, O, 1948:101-102, 1958:33,48; Lewis, DJ, *Bull. Brit. Mus. (NH), Ent. Ser.*, 1978, 37(6):269-270]

It is a common subgenus in Oriental Region and the Far East and 12 species have been identified in China. Nine of them – *anbuiensis*, *iyengari*, *kolosbanensis*, *malayensis*, *quanzhouensis*, *wuyishanensis*, *yaoi*, *zhengjiani* and *zhongji* – are mainly distributed in the south of Changjiang River. Three of them – *kbawi*, *nankiangensis* and *squamirostris* – are Palaearctic members and distributed in the north of Changjiang River.

18. *S. anbuiensis* Ge & Leng, 1990 [9] {5}

[Ge, NL & Leng, YJ : *Contr. Blood-sucking dipt. Ins.*, 1990, 2:110-116]

Holotype & Paratypes: FMJNU

Distribution: North, Yuexi (30.8°N), Anhui; East Jingxian (.4°E), Anhui; Southwest at Lingyun (24.3°N, 106.5°E), Guangxi covering 9 counties in 4 provinces and one autonomous region.

Anhui: Jingxian, Qianshan, Qimen, Shitai, Yuexi. (5)

Hubei: Yangxin. (1)

Jianhxi: Pengze. (1)

Guangxi: Lingyun. (1)

Zhejiang: Jiangde. (1)

19. *S. iyengari* Sinton, 1933 [3] {3}

[Sinton, JA: *Ind. J. Med. Res.*, 1933, 21(1):221-224; Raynal, J & Gaschen H.: *Bull. Soc. Path. Exot.*, 1935a, 1935b, 28(6):507-517, 582-592; Leng, YJ: *Acta Entomol. Sin.*, 1977, 20(3):331-336]

Chinese Specimen: FMJNU

Distribution: Northeast, Zhanjiang (21.2°N, 110.3°E), Guangdong; South, Danxian (19.5°N), Hainan; West, Mengla (101.5°E), Yunnan. *S. iyengari* is also noted in India, Laos, Malaysia, Thailand and Vietnam.

Guangdong: Zhanjiang. (1)

Hainan: Danxian. (1)

Yunnan: Mengla. (1)

20. *S. kbawi* Raynal, 1936 [55] {11}

[Raynal, J: *Ann. Parasit. hum. comp.*, 1936, 16(6):529-540]

S. kbawi is a common Chinese Palaearctic member and the type comes from the vicinity of Beijing.

Chinese Specimen: FMJNU

Distribution: North, Xingcheng (40.6°N), Liaoning; East, to sea; West, Wenxian (104.6°E), Gansu; South to Changjiang River at about 30°N except two counties each in North Guizhou and Yunnan of the Southwest Mountainous Area up to about 28°N and at about 105°E from West as it in the north of Changjiang River. This fly is also noted in Cambodia and Malaysia (Seccombe, Ready & Huddleston, 1993).

In China it seems that 105°E is the west and 28°N the south border for Chinese *S. squamirostris* and *S. kbawi*.

Beijing: Changping, Liangxiang, Miyun, Suburb, Yanqing. (5)

Gansu: Jingchuan, Lingtai, Ningxian, Wenxian, Zhengning. (5)

Guizhou: Bijie. (1)

Hebei: Xinglong. (1)

Henan: Kaifeng, Gongxian, Xinyang, Xingyang. (4)

Liaoning: Suizhong, Xingcheng. (2)

Shaanxi: Baoji, Chang'an, Chencheng, Fengxian, Jingyang, Hancheng, Huanglong, Meixian, Qishan, Xi'an, Weinan, Xunyi, Yanchang, Yichuan. (14)

Shandong: Boshan, Jinan, Kunyu, Laiyang, Rushan, Tai'an, Wendeng, Zibo, Zouping. (9)

Shanxi: Daning, Jixian, Licheng, Lingchuan, Linfen, Liulin, Pingshun, Taiyuan, Xiangyuan, Xiaoyi, Yongji, Yuxian. (12)

Tianjin: Suburb. (1)

Yunnan: Weixin. (1)

21. *S. kolosbanensis* Yao & Wu, 1946 [33] {6}

[Yao, YT & Wu, CC: *J. Parasitol.*, 1946, 32:87-90]

Holotype & Paratypes: SIPD

Distribution: North, Wenxian (33.0°N), Gansu; East, Yichang (111.2°E), Hubei; South, Jingxi (23.1°N), Guanxi; West, Maowen (103.8°E), Sichuan; covering 33 counties and cities in 5 provinces and one autonomous region.

Gansu: Wenxian. (1)

Guangxi: Debao, Jingxi, Lingyun. (3)

Guizhou: Chongjian, Ceheng, Qinglong. (3)

Hubei: Wudangshan, Yichang. (2)

Sichuan: Changning, Chongqing, Emei, Gaoxian, Gongxian, Guangyuan, Jiang'an, Junlian, Leshan, Maowen, Nanping, Rongxian, Wenchuan, Wulong, Xingwen, Zigong. (16)

Yunnan: Lúxi, Lùxi, Mengla, Menglian, Shidian, Weixin, Yanjin, Yongde. (8)

22. *S. kueichenae* Leng & He, 1995 [1] {1}

[Leng, YJ & He, MS: *Entomologia Sinica*, 2(1):13-17]

Holotype & Paratypes: FMJNU

Distribution: Mengyuan Cave, Mengla County, 21°24'N, 101°30', Yunnan Province. A limestone cave dweller.

Yunnan: Mengla (1)

23. *S. malayensis* (Theodor, 1938) Leng & Zhang,

1991 [13] {4}

[Leng, YJ & Zhang, LM: *Contr. Blood-sucking dipt. Ins.*, 1991, 3:93; Leng & Zhang: *Ann. Trop. Med. Parasitol.*, 1993, 87(1):91]

Synonyms:

1. *P. iyengari malayensis* Theodor, 1938

[Theodor, O: *Ind. J. Med. Res.*, 1938, 26(1):261-269]

2. *Phlebotomus iyengari hainensis* Yao & Wu, 1938

[Yao, YT & Wu CC: *Trans. 10t Congr. FEATM*, 1938a, 2:786-790]

3. *P. iyengari taiwanensis* Cates & Lien, 1970

[Cates, MD & Lien, JC: *J. Med. Ent.*, 1970, 7(5):530-533]

4. *S. hainanensis* Leng, 1977

[Leng, YJ: *Acta Entomol. Sin.*, 1977, 20(3):331-336; Ge, NL: *Postgraduate J. Jinan. Univ.*, 1988, 4(2):104-110].

S. hainanensis (Leng, 1977; Ge, 1988) had been used as the valid name for *malayensis* Theodor, 1938. But Theodor's paper was published earlier (July) than that of Yao & Wu's (December) though both in 1938. According to ICZN Article 23, Leng (1977, 1988) treated *S. malayensis* a valid

name instead of *S. hainanensis* and *bainanensis* and *taiwanensis* are synonyms of it.

Chinese Specimen: FMJNU

Distribution: North, Huoqiu (32.2°N), Anhui; East, Yilan (121.7°E), Taiwan; South, Lingshui (18.4°N), Hainan; West, Danxian (109.5°E), Hainan covering 13 counties in 4 provinces.

Anhui: Huoqiu. (1)

Guangdong: Shixing, Zhanjiang. (2)

Hainan: Baoting, Danxian (Nanfeng), Lingshui, Nada. (4)

Taiwan: Gaoxiong, Hualian, Pingdong, Taibei, Taidong, Yilan. (6)

24. *S. nankingensis* Ho, Tan, Chen & Wu, 1954 [4] [4]

[Ho, KT, Tan, CC, Chen, DH & Wu, CC: *Acta Entomol. Sin.*, 1954, 4:427-432]

Holotype & Paratypes: SIPD

Distribution: North, Xiangyang (32°N), Hubei; East, Nanjing (118.7°E, 32°N), Jiangsu; South, Jinzhai (31.6°N), Anhui; West, Shaanxi (109°E). It seems to distribute in a narrow zone around about 32°N.

Anhui: Jinzhai, Qianshan. (2)

Hubei: Xiangyang. (1)

Jiangsu: Nanjing. (1)

Shaanxi: County unknown.

25. *S. quanzhouensis* Leng & Zhang, 1987 [2] [1]

[Leng, YJ, Zhang, LM: *Acta Zootax. Sin.*, 1987, 12(2):192-199]

Holotype & Paratypes: FMJNU

Fujian: Quanzhou 24.8°N, 118.5°E and Xiamen (Amoy, 24.4°N, 118.1°E). (2)

26. *S. squamirostris* Newstead, 1923 [141] [16]

[Newstead, R: *Ann. Trop. Med. Parasitol.*, 1923, 17(4):531-532]

Type: LSTM, Chinese Specimen: FMJNU, SIPD

Distribution: The type of *S. squamirostris* was discovered in Japan, however being a Palaearctic member and the most common *Sergentomyia* from Liaohe River Plain of Liaoning in the north via North China Plain southwards to Changjiang River. Its north border at Lingyuan (41.2°N, 119.3°E) and Benxi (41.3°N, 124.1°E), Liaoning, the south in Yandang Mountain Range (28.0°N, 120.5°E), Zhejiang, the West at Wenxian (31°N, 104.9°E), southern Gansu and the east to sea. It covers 141 towns, counties and cities of 3 metropolises and 13 provinces. Among them are two cities and one county at the south bank and three counties in the south of Changjiang River.

Anhui: Boxian, Bengbu, Chuzhou, Fengtai, Guoyang, Jinzhai, Huaiyuan, Huangshan, Linqian, Mengcheng, Suixi, Taihe, Wuhe, Xiaoxian. (14)

Beijing: Liangxiang, Suburb, Tongxian, Yanqing. (4)

Gansu: Gangu, Jingchuan, Lingtai, Ningxian, Tianshui, Wenxian, Zhenyuan. (7)

Hebei: Dachang, Dingxian, Handan, Laishui, Qianxi, Qinglong, Sanhe, Xinglong, Xushui, Yixian, Zunhua. (11)

Henan: Gongxian, Kaifeng, Lingbao, Queshan, Tangyin, Xinyang, Xingyang, Yanshi. (8)

Hubei: Fancheng, Hong'an, Jingmen, Shennongjia, Yichang, Xiangyang. (6)

Jiangsu: Donghai, Ganyu, Huai'an, Huaiyin, Jiangpu, Liangyungang, Nanjing, Peixian, Pixian, Tongshan, Xinyi, Xuzhou, Yangzhou. (13)

Jiangxi: Jiujiang, Pengze. (2)

Liaoning: Anshan, Benxi, Dalian, Fengcheng, Jianchang, Jinxi, Lüshun (Port Arthur), Suizhong, Xingcheng, Xiuyan. (10)

Qinghai: Guanting, Minhe. (2)

Shaanxi: Baoji, Chang'an, Fengxiang, Huanglong, Huayin, Jingyang, Lantian, Meixian, Ningshaan, Qishan, Xi'an, Xianyang, Yanchang, Yichuan. (14)

Shandong: Anqiu, Boshan, Cangshan, Changqing, Dezhou, Feicheng, Gaomi, Haiyang, Heze, Jimi, Jinan, Jining, Jiyang, Kunyu, Laixi, Leling, Liangshan, Licheng, Linqi, Linyi, Linzi, Pingdu, Qingdao, Qixia, Rushan, Shouguang, Tai'an, Weifang, Weihai, Wendeng, Wulian, Yanzhou, Yexian, Yidu, Yishui, Yixian, Zhaoyuan, Zhucheng, Zouping, Zouxian. (40)

Shanghai: Xuhuiqu. (1)

Shanxi: Jixian, Linfen, Lingchuan, Taiyuan, Yongji. (5)

Tianjin: Suburb. (1)

Zhejiang: Deqing (Moganshan), Jiande, Leqing (North Yandangshan). (3)

S. squamirostris is recorded as a vector of *Trypanosoma bocagei*, a parasite of toads, in China (Adler & Theodor, 1957).

27. *S. wuyishanensis* Leng & Zhang, 1987 [2] [1]

[Leng, YJ & Zhang, LM: *Acta Zootax. Sin.*, 1987, 12(2):192-199]

Holotype & Paratypes: FMJNU

Fujian: Chong'an (27.7°N, 118°E), Wuyishan (26.4°N, 116.4°E). (2)

28. *S. yaoui* Theodor, 1958 [1] [1]

[Theodor, O: 1958, 35-36, 50; Leng, YJ: *Ann. Bull. Soc. Parasitol., Guangdong Province*, 1985, 7:190-192]

Holotype & Paratypes: NHML

Jiangxi: Jiujiang (29.7°N, 115.9°E). (1)

29. *S. zhengjiani* Leng & Yin, 1983 [14] [4]

[Leng, YJ & Yin, ZC: *Ann. Trop. Med. Parasitol.*, 1983, 77(4):426-428]

Holotype & Paratypes: FMJNU & NHML

Distribution: North, Maerkang (Barkam, 31.9°N), Sichuan; East, Pengze (116.5°E), Jiangxi; Southwest, Dali (25.6°N, 100.1°E), Yunnan covering 14 counties in 4 provinces. Hubei: Laifeng, Shennongjia, Wudangshan. (3)

Jiangxi: Jiujiang, Pengze. (2)

Sichuan: Lixian, Maerkang (Barkam), Maowen, Nanping, Wenchuan, Xiaojin. (6)

Yunnan: Dali, Huize, Yanjin. (3)

30. *S. zhongi* Wang & Leng, 1991 [2] [1]

[Wang, HB & Leng, YJ: *Ann. Bull. Soc. Parasitol., Guangdong Province*, 1991, 11(13):105-108]

Holotype & Paratypes: FMJNU

Zhejiang: Songyang (28.4°N, 119.4°E) and Zhoushan (Putuoshan, 30°N, 122.4°E). (2)

g. Subgenus *Parrotomyia* Theodor, 1958

[Theodor, O: 1958:33-42]

Five species of *Parrotomyia* have been found in China. *S. sumbarica* distributes in North Xinjiang between 42.8-44.4°N and 84.6-93.4°E. *S. barraudi*, *S. kwangsiensis*, *S. ludnicki* and *S. yiniare* members of Oriental Region, they are distributed in the south of Changjiang river. *S. barraudi* is the most common one, it covers 60 counties and cities of 16 provinces, autonomous regions and special zones between 21.4-33.1°N and 98.5-121.6°E. And in the south it opens to Bangladesh, Burma, Cambodia, India, Indonesia, Laos, Malaysia, Thailand and Vietnam and in the east to Japan.

31. *S. barraudi* Sinton, 1929 [60] {17}

[Sinton, JA: *Ind. J. Med. Res.*, 1929, 16(3):716-724; Raynal J & Gaschen, H: *Bull. Soc. Path. Exot.*, 1935, 28(2):113-118; Quate, LW: *Pacific Insects*, 1962, 4:251-267]

Chinese Specimen: FMJNU & SIPD

Distribution: North, Xiangyang (32°N), Hubei; East, Taidong (121.1°E), Taiwan; South, Mengla (21.4°N), Yunnan; West, Luxi (98.5°E), Yunnan covering 60 counties and cities in 14 provinces, one autonomous region and two special zones. In the south it opens to Bangladesh, Burma, Cambodia, India, Indonesia, Laos, Malaysia, Thailand and Vietnam and east to Japan. Anhui: Boxian, Chuxian, Huangshan, Linqian, Shexian, Shitai, Taihe, Yuexi. (8)

Fujian: Chong'an. (1)

Guizhou: Congjiang. (1)

Guangdong: Zhanjiang. (1)

Guangxi: Guiping, Lingyun, Wuming, Wuzhou. (4)

Hainan: Baisha, Nada. (2)

Hong Kong. (1)

Hubei: Jingmen, Xiangyang, Yicheng. (3)

Hunan: Huayuan. (1)

Jiangsu: Nanjing. (1)

Jiangxi: Dayu, Jiujiang, Pengze. (3)

Macao. (1)

Shaanxi: county unknown.

Sichuan: Changning, Chongqing, Emei, Gaoxian, Gongxian, Guanxian, Hejiang, Jiang'an, Junlian, Leshan, Maowen, Nanchuan, Pengxian, Rongxian, Wenchuan, Wulong, Xiaojin, Xingwen, Yibin, Zigong. (20)

Taiwan: Hualian, Taipei, Taidong. (3)

Yunnan: Baoshan, Huize, Kunming, Luxi, Mengla, Mengzi (zhicun), Yanjin. (8)

Zhejiang: Jiande, Zhoushan (Putuoshan). (2)

32. *S. kwangsiensis* Yao & Wu, 1941 [6] {3}

[Yao, YT & Wu, CC: *Chn. med. J.*, 1941, 59:67-76; Chen, HT & Hsu, PK *et al.*: *Acta Ent. Sin.*, 1955, 5(3):295-306; Leng, YJ: *Acta Entomol. Sin.*, 1964, 13(1):118-128]

Synonyms:

1. *S. barraudi kwangsiensis* Yao & Wu, 19412. *S. barraudi siulamensis* Chen & Hsu, 1955

Holotype & Paratypes: ZUMS

Taxonomy: Here *S. b. siulamensis* is treated as a synonym of *S. b. kwangsiensis* and *S. b. kwangsiensis* is treated as a isolated species.

Distribution: North, Guangzhou (23.1°N), Guangdong; East, Zhongshan (113.3°E), Guangdong; South, Baisha (19.2°N),

Hainan; West, Debao (106.6°E), Guangxi covering 6 counties of two provinces and one autonomous region in the southeastern corner of China.

Guangdong: Guangzhou, Zhongshan (Xiaolan, Siulam). (2)
Guangxi: Debao, Nanning. (2)

Hainan: Baisha, Danxian. (2)

33. *S. rudnicki* Lewis, 1978 [2] {1}

[Lewis, DJ: *Bull. Brit. Mus. (NH), Entom. Ser.*, 1978, 37(6):264-265; He, MS & Leng, YJ: *Ann. Bull. Soc. Parasitol., Guangdong Province*, 1991, 11(13):95-98]

Chinese Specimen: FMJNU

Yunnan: Mengla (21.4°N, 101.5°E) and Simao (22.7°N, 100.9°E). (2)

This fly is living in tropical rainforest and also found in Indonesia and Malaysia.

34. *S. sumbarica* Perfiliew, 1933 [4] {1}

[Perfiliew, PP: *Zool. Anzeiger*, 1933, 51(7/8):221-227; Guan, LR *et al.*: *Endem. Dis. Bull.*, 1987, 2(1):36-43]

Chinese Specimen: SIPD

Distribution: Northwest, Usu (44.4°N, 84.6°E); East, Qitai (89.5°E); South, Turpan (42.9°N); in the south of Jungger Basin. This fly is also found in Afghanistan, Iran, Iraq, Turkmenistan and Uzbekistan.

Xinjiang: Anjihai, Qitai, Turpan, Usu. (4)

35. *S. yini* Leng & Lin, 1991 [3] {2}

[Leng, YJ & Lin, LS: *Ann. Bull. Soc. Parasitol., Guangdong Province*, 1991, 11(13):101-104]

Holotype & Paratypes: FMJNU

Fujian: Chong'an (27.7°N, 118°E) and Wuyishan (26.4°N, 116.4°E). (2)

Sichuan: Wulong (29.3°N, 107.7°E). (1)

h. Subgenus *Sergentomyia* s. str. França & Parrot, 1920

[Franca, C & Parrot, L: *Bull. Soc. Path. Exot.*, 1920, 13(8):695-708]

Two species are reported, *S. sinkiangensis* and *S. sintoni*, from Xinjiang and the latter was found also in Afganistan, Egypt, Iran, Iraq, Kuwait, Turkey, and Uzbekistan.

36. *S. sinkiangensis* Leng, Lane & Lewis, 1987 [20] {3}

[Leng, YJ, Lane, RP & Lewis, DJ: *Ann. Bull. Soc. Parasitol., Guangdong Province*, 1987, 8(9):40-43]

Synonym: *S. minutus sinkiangensis* Ting & Ho, 1962 [Ding, ST & Ho, KT: *Acta Entomol. Sin.*, 1962, 11(4):388-393]
Lectotypes: FMJNU & NHML

Taxonomy: *S. sinkiangensis* was wrongly treated and named as *S. minutus sinkiangensis* by Ting & Ho in 1962. Dr. RP Lane pointed it out that if it were a subspecies it should be a member of Group *antennatus* of Abonnec (1972) instead of *minutus*. This fly was redescribed and renamed by Leng, Lane and Lewis (1987) according to the lectotypes. Distribution: A desert, semi-desert and grassland dweller. North, Karamay (45.6°N), Xinjiang; East, Ejia Qi (101°E), Inner Mongolia; South, Yecheng (37.8°N), Xinjiang; West, Artux (76.1°E), Xinjiang covering 20 counties along the north of Old Silk Road.

Gansu: Dunhuang (might be other species awaiting for confirmation, Prof. He Xun CAO, 1989). (1)

Inner Mongolia: Ejina Qi. (1)

Xinjiang: Aksu, Artux, Anjihai, Bachu, Hami, Karamay, Kashi (Kaxgar), Keping, Kuqa, Shache, Shanshan, Shayar, Tarim, Toksun, Turpan, Usu, Wensu, Yecheng. (18)

S. sinkiangensis is considered a vector of lizard leishmaniasis in China according to experimental and natural infection and its close bionomic relationship with lizard. Natural infection with a rate of 15.4 % has been estimated in Ejina Banner, Inner Mongolia (Guan 1991, 1994).

37. *S. sintoni* Pringle, 1953 [5] {1}

[Pringle, G: *Bull. ent. Res.*, 1953, 43:707-734]

Synonym: *S. aparklensis* Perfiliew, 1933 [Perfiliew, PP: *Zool. Anzeiger.*, 1933, 51(7/8):221-227; Jin, CF, Xiong, KH: *Edem. Dis. Bull.*, 1987, 1(2):134-136]

Chinese Specimen: SIPD

Distribution: This fly living in desert, semi-desert and grassland of North Xinjiang around Jungger Basin. Northeast at Karamay (45.6°N, 84.8°E); Southeast at Shanshan (42.8°N, 90.2°E).

Xinjiang: Jungger Basin (southwestern part), Karamay, Mosuowan, Shanshan, Turpan. (5)

i. *nicnic* Group Theodor, 1948

[Theodor, O: *Bull. ent. Res.*, 1948, 9(1):102-103]

Two species are recorded in this group, which is distributed in South and Southwest China. *S. campester* is common in Hainan and *S. bailyi* in Sichuan. The north border of *S. bailyi* is at Guangyuan (32.4°N, 105.8°E), Sichuan and that of *S. campester* is at Emei (29.6°N, 103.4°E) while in the south both of them open to Cambodia, India, Laos, Pakistan, Thailand and Vietnam.

Taxonomy: After a comparative study in morphology and geographical distribution Leng (1980) considered *bailyi* and *campester* are two different species even Quate (1962) synonymized *campester* to *bailyi*.

38. *S. bailyi* Sinton, 1931 [15] {4}

[Sinton, JA: *Ind. J. med. Res.*, 1931, 18(3):821-829; Leng, YJ: *Acta Jinan Univ. (nat. Sci.)*, 1980, 2(2):23-30]

Chinese Specimen: FMJNU

Distribution: Northwest, Jinchuan (31.4°N, 102°E), Sichuan; Southeast, Danxian (19.5°N, 109.5°E), Hainan covering 15 counties and cities in 4 provinces of South and Southwest China.

Guangdong: Zhanjiang. (1)

Hainan: Danxian(Nanfeng), Nada. (2)

Sichuan: Gaoxian, Gongxian, Guangyuan, Jiang'an, Jinchuan, Junlian, Nanchuan, Rongxian, Yibin, Zigong. (10)

Yunnan: Longling, Mengla. (2)

39. *S. campester* (Sinton, 1931) Leng, 1980 [20] {4}

[Sinton, JA 1931: see above; Raynal, J & Gaschen, H: *Bull. Soc. Path. Exot.*, 1934a, 27(6):564-569, 1934c, 27(9):858-862; Leng, YJ: *Acta Jinan Univ. Nat. Sci.*, 1980, 2(2):23-30]

Synonym: *S. bailyi campester* Sinton, 1931

Chinese Specimen: FMJNU

Distribution: North, Emei (29.6°N), Sichuan; East, Wenchang (110.7°E), Hainan; South, Yaxian (18.2°N), Hainan; West, Shidian (99.1°E), Yunnan covering 20 counties in 4 provinces.

Guangdong: Zhanjiang. (1)

Hainan: Baisha, Baoting, Dongfang, Danxian, Haikou, Lingao, Lingmen, Lingshui, Nada, Qiongdong, Qionghai, Tunchang, Wanning, Wenchang, Yaxian. (15)

Sichuan: Emei, Zigong. (2)

Yunnan: Shidian, Simao. (2)

j. Ungrouped

Two morphologically strange *Sergentomyia*, *S. fanglianensis* Leng, 1964 from Hainan and *S. yunnanensis* He & Leng from Yunnan are included here awaiting for further study to classify their taxa of ranks for subgenera.

40. *S. fanglianensis* Leng, 1964 [1] {1}

[Leng, YJ: *Acta Entomol. Sin.*, 1964, 13(1):118-121]

Holotype & Paratypes: FMJNU

Hainan: Baisha (19.2°N, 109.4°E). (1)

41. *S. yunnanensis* He & Leng, 1991 [1] {1}

[He, MS & Leng, YJ: *Ann. Bull. Soc. Parasitol., Guangdong Province*, 1991, 11(13):95-98]

Holotype & Paratypes: FMJNU

Yunnan: Yuanjiang (23.5°N, 101.9°E). (1)

k. Species needing further study

42. *S. pooli* Yao & Wu, 1941 [1] {1}

[Yao, YT & Wu, CC: *Chn Med. J.*, 1941, 59:67-76]

Holotype & Paratypes: SIPD

Guangxi: Debao (23.3°N, 106.6°E). (1)

No further confirmation of the presence of this species from China and other part of the world after more than 54 years.

43. *S. suni* Wu, 1954 [7] {3}

[Wu, CC: *Acta Ent. Sin.*, 1954, 4(3):287-288; Hsiung, GH, Guan, LR & Jin, CF: *Acta Entomol. Sin.*, 1981, 24(4):430-431]

Holotype & Paratypes: SIPD

Distribution: Northeast, Taiyuan (37.8°N, 112.5°E), Shanxi; Southwest, Wenchuan (31.4°N, 103.6°E).

Shaanxi: Xi'an, Yichuan. (2)

Shanxi: Jixian, Liulin, Taiyan. (3)

Sichuan: Nanping, Wenchuan (Weizhou). (2)

Taxonomy: The original paper only described one incomplete female fly from Xi'an, Shaanxi Province. Hsiung *et al.* (1981) reported five males and four females from a place (Weizhou) in Sichuan province far south from the original site with the pharynx similar to but the cibarial cavity different from the original description. No details from Shanxi's report except a name with distribution (Lu, 1981a).

44. *S. turfanensis* Hsiung, Guan & Jin, 1981 [4] {1}

[Hsiung, KH, Guan, LR & Jin, CF: *Acta Entomol. Sin.*, 1981, 24(4):432-433]

Holotype & Paratypes: SIPD

Xinjiang: Bole, Shawan, Turpan, Urumqi. (4)

Taxonomy: The original description provided an insufficiently reliable and inadequate comparison for identifying a new species, but it may be a new record for China.

Diagrammatic distribution of Phlebotomine sandflies in China

Diagrammatic distribution of Phlebotomine sandflies in China

Diagrammatic distribution of Phlebotomine sandflies in China

F. THE NAMES

OF CHINESE PHLEBOTOMINES NOT INCLUDED

1. *S. fukienensis* Tang & Tang, 1959

[Tang, CC & Tang, CT: *Acta of Fukien Normal College*, 1959, (1):161-176]

Fujian: Fuzhou.

Only each one of an incomplete male and a female were described without necessary characters for species identification but it is obviously a member of *Sergentomyia*.

2. *S. fupingensis* Wu, 1954

[Wu, CC: *Acta Entomol. Sci.*, 1954, 4(3):288-290]

Shaanxi: Fuping.

It was only one incomplete female described belonging to subgenus *Sergentomyia* but no further evidence to confirm the presence of such fly in China during the past 41 years.

3. *S. kachekensis* Yao & Wu, 1938

[Yao YT & Wu, CC: *Trans. 10th Congr. FEATM*, 1938a, 2:773-811]

Hainan: Qiongzong.

Type specimen lost. According to the original data it was only one male described more or less like that of *S. kwangsiensis*. No further evidence for the presence of it during the past 57 years.

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