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## **Ichneumonidae parasitizing Sawflies from China (Hymenoptera)**

**Mao-Ling SHENG & Guo-Fa CHEN**

### **Abstract**

Fourteen species of Ichneumonidae, parasitoids of forest sawflies, are reported, of which one, *Isadelphus compressus* SHENG **sp. nov.**, is new to science. Three of them, *Mastrus deminuens* (HARTIG, 1838), *Olesicampe erythropygia* (HOLMGREN, 1860) and *Pleolophus suigensis* (UCHIDA, 1930) are first records for China, and most of their hosts are recorded for the first time. The variabilities of *Agrothereutes abbreviatus* (FABRICIUS, 1794), *Endasys liaoningensis* WANG & SUN, 1996 and *Olesicampe erythropygia* (HOLMGREN) are pointed out. The biologies of *A. abbreviatus* (FABRICIUS) and *E. liaoningensis* WANG & SUN are noted. The application of the parasitoids is discussed. Two categories of the parasitoids of forest sawflies, Dominant Controller and Sustained Controller, are proposed.

Key words: Hymenoptera; Ichneumonidae; variability, biology, forest sawfly, new species, China

### **Zusammenfassung**

Vierzehn Ichneumonidae-Arten, Parasitoide von Forst-Blattwespen, werden behandelt, wovon eine, *Isadelphus compressus* SHENG **sp. nov.**, neu für die Wissenschaft ist. Drei davon, *Mastrus deminuens* (HARTIG, 1838), *Olesicampe erythropygia* (HOLMGREN, 1860) and *Pleolophus suigensis* (UCHIDA, 1930), sowie die meisten ihrer Wirte werden erstmals für China gemeldet. Die Variabilitäten von *Agrothereutes abbreviatus* (FABRICIUS, 1794), *Endasys liaoningensis* WANG & SUN, 1996 and *Olesicampe erythropygia* (HOLMGREN) wird herausgestellt. Zu den Biologien von *A. abbreviatus* (FABRICIUS) and *E. liaoningensis* WANG & SUN wird berichtet. Die Verwendung der Parasitoide wird diskutiert. Die

Einteilung in zwei Kategorien wird für die Parasitoide vorgeschlagen: Dominant Controller und Sustained Controller.

### Introduction

In recent years, some sawflies, such as *Pachynematus itoi* OKUTANI in Liaoning Province, *Pristiphora erichsonii* (HARTIG) in some areas of Inner Mongolia, Heilongjiang, Jilin and Shanxi, *Diprion jingyuanensis* XIAO & ZHANG in Shanxi Province, *Neodiprion fengningensis* XIAO & ZHOU in Gansu and Liaoning Provinces, have been breaking out and caused enormous losses in some areas in China. We have been studying on their natural enemies, especially their Ichneumonidae parasitoids, to find some important natural enemies as candidates for biological control in future. In the course of investigation some new species, Chinese new records and new host records of Ichneumonidae have been found and published in succession. The general research result is reported herein after. In accordance with the natural situation the application of the parasitoids for biological control is discussed.

### Method

Most of the parasitoids emerged from the larvae and cocoons of sawflies collected from the pine woods where the sawflies were breaking out. They were bred or fostered indoors or outdoors. Some of the parasitoids were collected in the field when the investigation was going on in the pine woods mentioned above. Studies on the biologies of *Agrothereutes abbreviatus* (FABRICIUS, 1794) and *Endasys liaoningensis* WANG & SUN, 1996 were carried out indoors, tested and verified in the field.

### Results

#### *Isadelphus* FÖRSTER, 1869

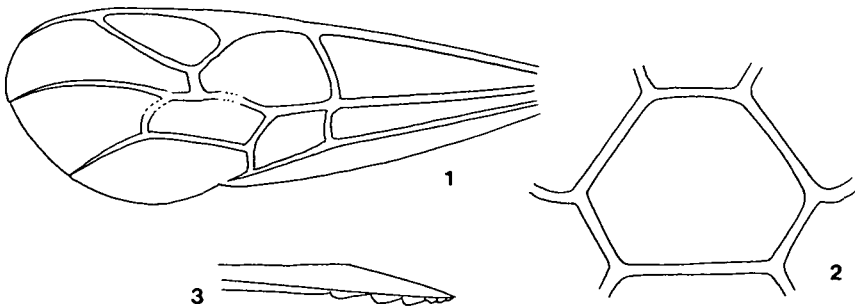
*Isadelphus* FÖRSTER, 1869, a first record in China, belonging to the tribe Mastrini of the subfamily Phygadeuontinae, is represented by 7 species of which two, *I. caudatus* (PROVANCHER, 1875), *I. cressonii* (RILEY, 1869), are distributed in the Nearctic Region, five of them, *I. armatus* (GRAVENHORST, 1829), *I. coriarius* (TASCHENBERG, 1865), *I. gallicola* (BRIDGMAN, 1880), *I. inimicus* (GRAVENHORST, 1829) and *I. pusillus* HELLÉN, 1967, are in the Palearctic Region.

Diagnosis: apical margin of clypeus with two teeth; epomia present or reduced; notaulus not reaching to center of mesoscutum; the second recurrent vein distinctly inclivous, with one bulla; second intercubitus absent; ovipositor sheath 1.8 to 3.5 times as long as hind tibia; ovipositor long, decurved, with a very weak nodus and fine teeth on the sub-apex of lower valve.

#### *Isadelphus compressus* SHENG sp. nov.

♀ body about 5 mm long. Fore wing about 3.8 mm long. Face 1.85 times as wide as long, weakly convex centrally, with leathery texture and indistinct punctures. Clypeus weakly convex, apical 0.75 smooth with few big punctures, its apical margin weakly

premorse and with two indistinct teeth centrally. Mandible long, with two sharp apical teeth, upper tooth longer than lower tooth. Malar space about as long as the basal width of mandible. Temple wide, with fine leathery texture and sparse indistinct punctures, nearly not convergent backward. Vertex evenly convex, with fine leathery texture. Stemmaticum weakly convex, Postocellar line about 0.89 time as long as ocular-ocellar line. Frons nearly flat (very weakly convex), with surface a little rougher than vertex, lower portion concave with transverse wrinkles. Occipital carina complete and strong; genal carina reaching Hypostomal carina above the base of mandible. Antenna filiform; flagellum with 23 segments, each of them longer than its own diameter; first flagellar segment 3.6 times as long as its own apical diameter, about 0.9 as long as the second flagellar segment, about as long as the third. Front portion of pronotum glossy, hind portion with fine leathery texture, its lateral center with weak oblique wrinkles. Epomia distinct. Mesoscutum convex, with the surface like as vertex with; notaulus distinct, reaching about 0.3 the length of mesonotum. Mesopleurum with regular oblique wrinkles. Sternaulus deep, nearly straight and reaching hind edge of mesopleurum above its lower hind corner. Scutellum small, nearly glossy, convex and with weak fine punctures. Metapleurum with weak oblique wrinkles; juxtacoxal carina complete. Wing hyaline; nervulus a little bend backward, distad of basal vein; the latter a little bend forward. Areolet open. Stigma big. Second recurrent vein inclivous, with one bulla. Nervellus strongly inclivous, intercepted at lower 0.33. Propodeum completely areolated; basal area and first lateral areas very weakly rough; the rest portion nearly glossy and with weak irregular wrinkles; spiracle small, round. Legs strong; third tarsus of hind leg about 1.45 times as long as fifth tarsus. Abdomen compressed (from third segment to its end); first tergite about 1.7 times as long as its apical width; lateral margins of postpetiole parallel, with fine leathery texture centrally and fine longitudinal wrinkles laterally; median dorsal carina weak, reaching past the center of first tergite; dorsolateral carina complete; spiracle small and round, behind the middle of first tergite. Tergites 2 and 3 with leathery texture (the latter weaker than the former). The rest tergites glossy with sparse and very fine punctures. Ovipositor sheath about as long as abdomen, about 1.8 times as long as hind tibia. Ovipositor decurved, with a very weak nodus and weak oblique teeth on the subapex of lower valve.



Figs. 1-3 *Isadelphus compressus* SHENG sp. nov.: 1 fore wing; 2 areola; 3 apical part of ovipositor.

Black. Scapes, median parts of mandibles, palpi, legs (except hind tibiae and fifth tarsi of all legs darkish brown), tergite 2 of abdomen, basal half (more or less) of tergite 3, basal margin of tergite 4 brown. Ventral sides of antennae dark brown. Dorsal sides of antennae and tegulae brownish black. Humeral plates yellow. Stigmata light brown. Veins darkish brown. Narrow hind margin of tergite 6 centrally, central portions of tergites 7 and 8 white.

Holotype ♀, Benxi, Liaoning Province, Aug. 20, 1997, Mao-Ling SHENG.

Host: Reared from cocoon of *Pachynematus itoi* OKUTANI.

This new species is similar to *I. inimicus* (GRAVENHORST), but can be distinguished from the latter by the following characters: Abdomen compressed (from third segment to its end); first tergite about 1.7 times as long as its apical width, with fine leathery texture centrally and fine longitudinal wrinkles laterally; second tergite transverse.

***Agrothereutes abbreviatus* (FABRICIUS, 1794)**

Specimens examined: 1 ♀, Benxi, Liaoning Province, Aug. 20, 1997, M.-L. SHENG; 3 ♀♀ (emerged from *Pachynematus itoi* indoors), Benxi, Liaoning Province, March 31 - April 6, 1998, M.-L. SHENG; 1 ♀, Benxi, Liaoning Province, May 18, 1998, M.-L. SHENG; 1 ♀, Benxi, Liaoning Province, June 18, 1998, M.-L. SHENG.

Variability: Wing very short, only reaching to the hind margin of postscutellum, to relatively long, reaching to first abdominal tergite. Basal transverse carina of propodeum very weak to relatively strong; apical carina complete or only present lateral. Head and thorax black to with big dark brown to brownish black spots.

Biology: Adults occur in May to June, act nimbly, take cover beneath the fallen leaves at sunny days to look for its hosts and usually like to move about on the ground or fallen leaves at cloudy days. They parasitizes prepupa and pupa in cocoon of *Pachynematus itoi* OKUTANI.

***Agrothereutes macroincubitor* (UCHIDA, 1931)**

Specimens examined: 2 ♂♂ (emerged from *Pachynematus itoi* indoors), April 1-8, 1998, 1 ♀, May 9, 1998, Benxi, Liaoning Province, M.-L. SHENG.

Host: *Pachynematus itoi* OKUTANI.

***Aptesis grandis* SHENG, 1998**

Specimens examined: 1 ♀, Qingyuan, Liaoning Province, June, 1985, Y.-W. SONG; 1 ♀, Qiuwan, 1300 m, Shanxi Province, June 13, 1994, M.-L. SHENG; 11 ♀♀ 39 ♂♂, Taiyueshan, Shanxi Province, June 14-20, 1995, G.-F. CHEN; 1 ♀, Baiyin, Gansu Province, June 2, 1999, M.-L. SHENG.

Host: *Diprion jingyuanensis* XIAO & ZHANG, *Neodiprion fengningensis* XIAO & ZHOU.

***Arenetra genangusta* SHENG & ZHANG, 1997**

Specimens examined: 2 ♀♀ 2 ♂♂, Tonghua, Jilin Province, June 30, 1996, M.-L. SHENG; 1 ♀ (emerged from *Pachynematus itoi* indoors), Benxi, Liaoning Province, May 12, 1998, M.-L. SHENG.

Host: *Pachynematus itoi* OKUTANI.

***Bathythrix cilifacialis* SHENG, 1998**

Specimens examined: 3♀♀, Benxi, Liaoning Province, Aug. 16-30, 1997, M.-L. SHENG; 1♀, Benxi, Liaoning Province, Sept. 17, 1997, M.-L. SHENG; 2♀♀ (emerged from *Pachynematus itoi* indoors), Benxi, Liaoning Province, May 10-12, 1998, M.-L. SHENG.

Host: *Pachynematus itoi* OKUTANI.

***Endasys liaoningensis* WANG & SUN, 1996**

Specimens examined: 68♀♀ 21♂♂, Benxi, Liaoning Province, June, 1998, M.-L. Sheng; 2♂♂, Xixia, 1550 m, Henan Province, July 17, 1998, M.-L. SHENG; 5♀♀, Benxi, Liaoning Province, Sep. 16, 1998, M.-L. SHENG.

Variability: Tergites 2 and 3 of abdomen red, reddish brown, light brown or black entirely.

Biology: Adults occur from May to September, act nimbly, take cover beneath the fallen leaves to look for its hosts, usually like flying at cloudy days. They parasitizes prepupa and pupa in cocoon of *Pachynematus itoi* OKUTANI.

***Exenterus chinensis* GUPTA, 1993**

Specimens examined: 1♂, Qinyuan, Shanxi Province, June 14, 1995, G.-F. CHEN; 1♀ 8♂♂, Qinyuan, Shanxi Province, June 20, 1995, G.-F. CHEN; 2♀♀ 18♂♂ (emerged from *Neodiprion fengningensis* indoors), Baiyin, Gansu Province, April 20-22, 1999, M.-L. SHENG.

Host: *Diprion jingyuanensis* XIAO & ZHANG, *Neodiprion fengningensis* XIAO & ZHOU.

***Himerta impuncta* SHENG, 1998**

Specimens examined: 6♀♀ 4♂♂ (emerged from *Pristiphora erichsonii* indoors), Daxinggou, Jilin Province, May 4-June 20, 1994, M.-L. SHENG; 3♀♀ 8♂♂ (emerged from *Pristiphora erichsonii* indoors), Qinhuangdao, 1150 m, Hebei Province, April 16-June 8, 1997, M.-L. SHENG; many specimens reared from *Pristiphora erichsonii* (HARTIG) were also seen in Inner Mongolia in September, 1995.

Host: *Pristiphora erichsonii* (HARTIG).

***Mastrus deminuens* (HARTIG, 1838)**

New record in China.

Specimens examined: 2♀♀, Qinyuan, Shanxi Province, June, 1995; 5♀♀ 2♂♂, Qinyuan, Shanxi Province, July, 1996; 1♀, Qinyuan, Shanxi, June 12, 1999, Guo-Fa CHEN.

Host: *Diprion jingyuanensis* XIAO & ZHANG.

***Pleolophus setiferae* (UCHIDA, 1936)**

Specimens examined: 1♀, Wutaishan, Shanxi Province, May 26, 1995, Mao-Ling SHENG; 2♀♀, Xinbin, Liaoning Province, June, 1993, Jianwen SUN; 1♀ (emerged from *Neodiprion fengningensis* indoors), Baiyin, Gansu Province, April 22, 1999, Mao-Ling SHENG; 1♀ (emerged from *Neodiprion fengningensis* indoors), Baiyin, Gansu Province, June 2, 1999, Mao-Ling SHENG.

Hosts: *Pachynematus itoi* OKUTANI, *Pristiphora erichsonii* (HARTIG), *Neodiprion fengningensis* XIAO & ZHOU.

***Pleolophus suigensis* (UCHIDA, 1930)**

New record in China.

Specimen examined: 1♀, Qinyuan, Shanxi Province, June 14, 1994, Mao-Ling SHENG.

Host: *Diprion jingyuanensis* XIAO & ZHANG.

***Olesicampe erythropya* (HOLMGREN, 1860)**

New record in China.

Species examined: 1♀ (emerged from *Pristiphora erichsonii* indoors), Daxinggou, Jilin Province, April 20, 1994, M.-L. SHENG; 5♀♀, June 6-10, 1996; 2♂♂ (emerged from *Pristiphora erichsonii* indoors), April 20-May 6, 1997, Qinhuangdao, 1100 m, Hebei Province, M.-L. SHENG.

Variability: Glymma small to obsolescent. Ovipositor 0.5 to 1.0 time as long as apical depth of abdomen. Hind coxae black or sometimes with unclear dark flecks or brownish black. Abdomen black or tergites 3 and 4 with indistinct reddish fleck laterally.

Host: *Pristiphora erichsonii* (HARTIG).

***Phygadeuon* spec.**

Species examined: 1♀ (apical part of antenna lost), Wutaishan, Shanxi Province, June 10, 1995, M.-L. SHENG.

Host: Reared from cocoon of *Pristiphora erichsonii* (HARTIG).

### Discussion

In generally, the parasitoids of forest sawflies may be divided into two categories: Dominant Controller and Sustained Controller.

Dominant Controller: Its population increases quickly with its host (sawfly) breaking out. Its highest peak just follows that of its host. It could reach the largest population in the year when its host breaks out or in the second year. The population of its host could sharply decrease to very low level. *Endasys liaoningensis*, a very important parasitoid of *Pachynematus itoi* in Benxi and Xinbin, Liaoning Province, *Himerta impuncta*, a parasitoid of *Pristiphora erichsonii* in Daxinggou, Jilin Province, and *Exenterus chinensis*, a parasitoid of *Neodiprion fengningensis* in Baiyin, Gansu Province, belong to this category.

Sustained Controller: Its population generally may keep in very low level when its host breaks out. But its parasitic rate could reach to relatively high level. *Exenterus chinensis*, a parasitoid of *Diprion jingyuanensis* in Qinyuan, Shanxi Province, *Bathythrix cilifacialis*, parasitizing *Pachynematus itoi* in Benxi, Liaoning Province, belongs to this category.

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**SMOLIK, H.-W. 2001: Zackenfrack versteht zu leben - Erfahrungen und Einsichten eines Maikäfers.** - Basiliken Presse, Marburg/ Lahn. Mit Illustrationen von A. SCHAEFER-AST, bearbeitet von S. SMOLIK-PFEIFER. Erstauflage 1947.

Der Autor des hübschen kleinen Bändchens nimmt und mit in die fremde Welt der Insekten. Der liebste und den Augenblick genießende Maikäfer Zackenfrack spielt die Hauptrolle und besteht so manches Abenteuer. Der Leser taucht in die Welt der Insekten ein und bekommt einen Spiegel seiner eigenen Welt vorgehalten, denn die Darsteller agieren wie Menschen. So nebenbei lernt er auch manches über die Welt der Insekten. Der besondere Reiz des Büchleins ist die Alltagsphilosophie des lebenslustigen Hauptdarstellers, die durch ein Zitat illustriert sei: „Es ist darum wichtig, sich immer wach und aufnahmebereit zu erhalten, sich nicht in irgend etwas zu verrennen und zu verbeißen, damit wir diese Tage des Glücks zu erkennen vermögen und nicht blind und taub für die Größe und die Möglichkeiten des Augenblicks sind. Lebewesen, die sich an Grundsätze klammern, sind immer blind. Lebewesen, die auf ihrem Standpunkt verharren, haben einen Gesichtskreis mit dem Durchmesser null.“

Klaus SCHÖNITZER

**Lastuvka, Z. & Lastuvka, A. 2001: The Sesiidae of Europe.** - Apollo Books, Stenstrup, 245 S.

Von den weltweit 1200 Glasflügler-Arten (Sesiidae) kommen in Europa 107 Arten vor; sie sind Inhalt dieses taxonomischen Werkes aus dem dänischen Apollo Books Verlag. Diese Monographie verschwendet nicht viele Worte, sondern beginnt nach einer 5-seitigen Einführung über die Morphologie dieser Gruppe gleich mit Bestimmungsschlüsseln zu Unterfamilien, Triben und Gattungen sowie innerhalb der einzelnen Gattungen zu den Arten (16 Seiten). Bis Seite 97 werden die einzelnen Arten kurz anhand von Synonymie, Diagnose, Genitalien, Biologie und Habitat, Verbreitung und Bemerkungen vorgestellt. Der Rest des Werkes ist den Abbildungen gewidmet: 9 Farbtafeln und 107 Tafeln zu morphologischen und genitalmorphologischen Details inklusive Verbreitungskarten.

Eine kompakte, nichtsdestoweniger professionelle, detaillierte und empfehlenswerte Darstellung.

R. GERSTMEIER

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