

The genus *Ammophila* W. Kirby, 1798 (Hymenoptera: Sphecidae) in Vietnam, Laos, and Cambodia

Род *Ammophila* W. Kirby, 1798 (Hymenoptera: Sphecidae) в фауне Вьетнама, Лаоса и Камбоджи

Р.Н. Pham

П.Х. Фам

Institute of Biology, Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet, Nghia Do, Ha Noi Vietnam.
E-mail: phong.wasp@gmail.com

Институт биологии, Вьетнамская академия наук и технологий, Хоанг Куок Вьет, 18, Нгиа До Ханой Вьетнам.

Key words: sphecoid wasps, distribution, first record, taxonomy, Indochina.

Ключевые слова: осы, распространение, первая находка, таксономия, Индокитай.

Abstract. The genus *Ammophila* Kirby, 1798 in Vietnam, Laos, and Cambodia is studied. A total of four species, *Ammophila clavus* (Fabricius, 1775), *A. globifrontalis* Li et Yang, 1995, *A. laevigata* (F. Smith, 1856), and *A. sabulosa* (Linnaeus, 1758) are recorded for these three countries. The genus *Ammophila* and *A. sabulosa* are reported for the first time from Cambodia and Vietnam, respectively. A key to the species of *Ammophila* in the three countries and their distribution are provided.

Резюме. Изучен род *Ammophila* Kirby, 1798 фауны Вьетнама, Лаоса и Камбоджи. Для этих трех стран выявлено четыре вида: *Ammophila clavus* (Fabricius, 1775), *A. globifrontalis* Li et Yang, 1995, *A. laevigata* (F. Smith, 1856) и *A. sabulosa* (Linnaeus, 1758). Род *Ammophila* и вид *A. sabulosa* впервые указываются для фауны Камбоджи и Вьетнама. Приведен ключ для определения видов *Ammophila* в этих трех странах и их распространение.

Introduction

Ammophila is a large genus of slender, solitary wasps and consists of 243 species distributed worldwide, of which about 107 species are known from the Palearctic and Oriental regions [Pulawski, 2026]. *Ammophila* wasps have received a lot of biological studies primarily because of their hunting and nesting behaviours, and most particularly their use of pebbles as ‘tools’ during nest closure. ‘tool-using’ behaviour was a sign of intelligence, making the genus a popular object of behavioural studies [Evans, 1959; Tsuneki, 1968]. In the Oriental region, the taxonomy of the genus has received an interest of several authors, for example Kohl [1906], Dollfuss [2013a, 2015], Danilov [2015], Wang et al. [2018], and Pham et al. [2026]. About the biology, Maxwell-Lefroy [1909] briefly remarked on the nesting site and prey of *Ammophila laevigata* (F. Smith, 1856) in India; Iwata [1939, 1964] observed the nesting behaviour of *Ammophila clavus* (Fabricius, 1775) in Taiwan and

Thailand, respectively; Krombein [1984] observed the nesting behaviour of *A. clavus* (as *Ammophila atripes* F. Smith, 1852) and *A. laevigata* in Sri Lanka; and Pham et al. [2024] studied on the nesting biology of *A. clavus*, *Ammophila globifrontalis* Li et Yang, 1995, and *A. laevigata* in Vietnam.

Vietnam, Laos and Cambodia are countries within the Indochina Peninsula of mainland Southeast Asia. The genus *Ammophila* has been recorded in two of three countries, including Vietnam and Laos, by Nguyen et al. [2007], Dollfuss [2013b, 2015], Tano, Kurokawa [2015], Danilov [2020], Pham, Antropov [2021], Pham, Nguyen [2023], and Pham et al. [2015, 2019, 2020, 2024, 2026]. During recent expeditions in Cambodia, I found the genus *Ammophila* which I recognized as new to this country. The present paper aims to report the genus *Ammophila* in Vietnam, Laos, and Cambodia and to provide a key to the *Ammophila* species for this peninsular region.

Materials and methods

Specimens were collected using sweep nets and Malaise traps at many localities in Vietnam, Laos and Cambodia. Underground nests of species encountered were also collected. The nest contents exhumed, including cocoons, eggs, larvae, and prey were put in glass tubes (5–8 cm long and 1–1.5 cm in diameter). These tubes were then buried into the ground, about 5 cm deep and they were briefly checked once a day. Adult wasps that emerged from the glass tubes were collected, killed with a killing jar charged with ethyl acetate, pinned and dried.

Adult morphological characters were observed from pinned and dried specimens with the aid of a Nikon SMZ745 stereomicroscope. Photographs were taken with a digital camera attached to the Nikon SMZ800N digital stereomicroscope, then stacked by CombineZM. All images and plates were processed with Adobe Pho-

toshop CS6. Bohart and Menke [1976], Li and Yang [1995], Dollfuss [2013a], and Wang et al. [2018] were used to identify all *Ammophila* taxon levels. A key to the *Ammophila* species from Vietnam, Laos, and Cambodia was constructed based on the specimens examined and publications of Li and Yang [1995] and Dollfuss [2013a]. Information on the taxonomic history of *Ammophila* was taken from Pulawski [2026].

The specimens examined in the present study are deposited in the Institute of Biology (IB), Vietnam Academy of Science and Technology, Ha Noi, Vietnam.

The present work is registered in ZooBank (www.zoobank.org) under urn:lsid:zoobank.org:pub:D6978E0C-8AAE-4FA1-84B5-79DD126258AD

Results

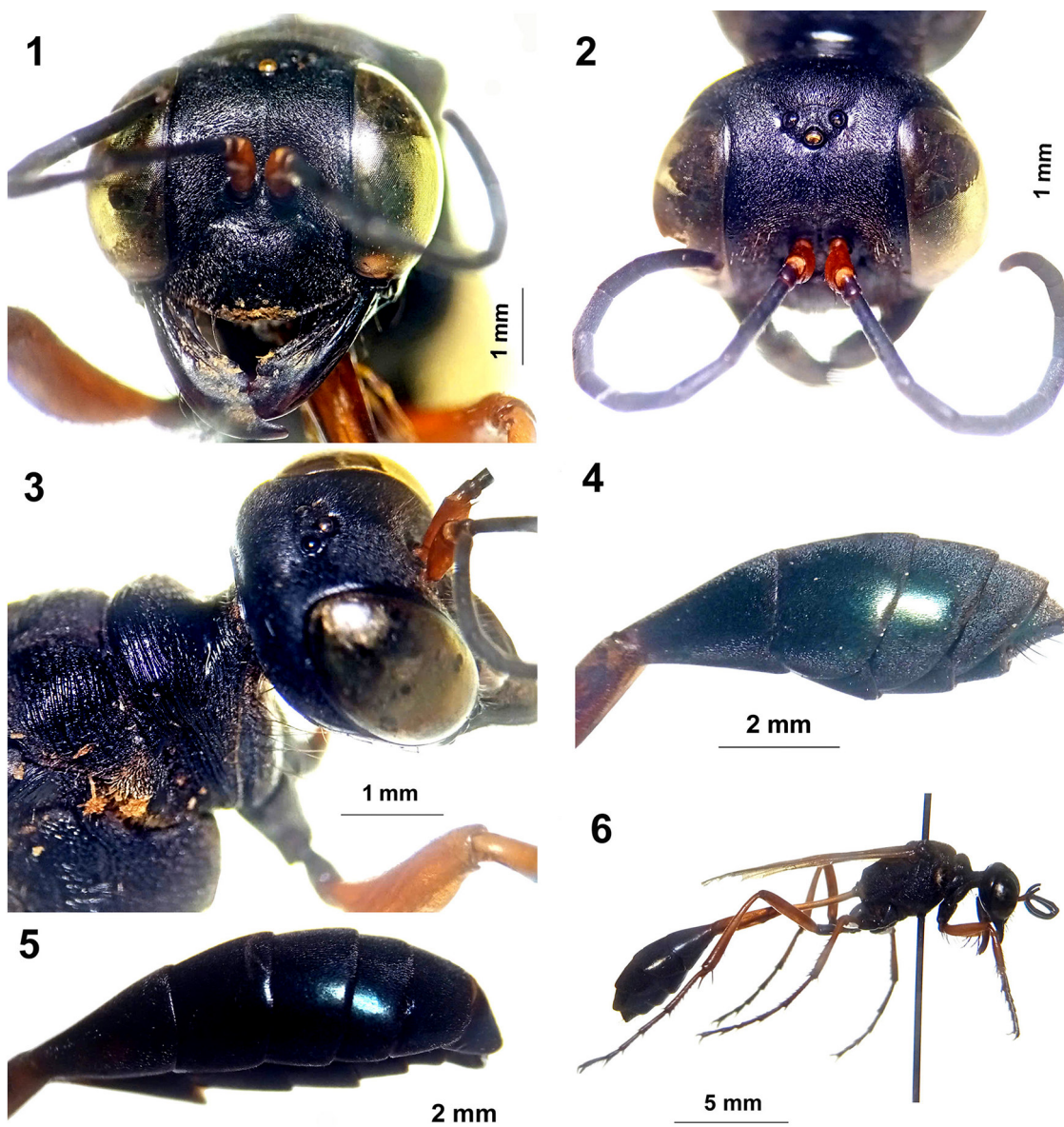
Sphecidae

Ammophila W. Kirby, 1798

Ammophila clavus (Fabricius, 1775)

Figs 1–6.

Material examined. CAMBODIA. Mondulkiri: 2♀♀, Senmonorom, 23.ix.2018, sweep net, Coll. Tu Thanh Nguyen, IB. LAOS. Khammouane: 2♀♀, 2♂♂, Hin Namno National Park, Boualapha, 21–28.i.2021, Malaise trap, Coll. Nguyen Dinh Duy, IB; Vientiane: 2♀♀, Phu Khao Khoay National Park, 20.x.2017, sweep net, Coll. Tru Vu Hoang, IB; Bolikhamsai: 2♂♂, Nam Kading National Protected Area, 19.iii.2018, forest, Coll. Pham Thi Nhi, IB. VIETNAM. Quang Ninh: 4♀♀, 2♂♂, Po Hen, Quang Duc, Bai Chay, Uong Bi, and Duc Chinh,



Figs 1–6. *Ammophila clavus* (Fabricius), female (1, 3, 4, 6), male (2, 5). 1 — head, frontal view; 2 — head, dorsal view; 3 — head and pronotum, dorsolateral view; 4, 5 — metasoma, lateral view; 6 — habitus, lateral view.

Рис. 1–6. *Ammophila clavus* (Fabricius), самка (1, 3, 4, 6), самец (2, 5). 1 — голова спереди; 2 — голова сверху; 3 — голова и пронотум дорсолатерально; 4, 5 — метасома сбоку; 6 — общий вид сбоку.

26.vi.2013, 5.iv.2018, 15.vi.2023, 26.viii.2024, sweep net, Colls. Phong Huy Pham, Linh Van Khuc, IB; Lang Son: 4♂♂, Tam Thanh and Huu Lien nature reserve, 22.vi.2014, 22–26.vii.2025, nests, sweep net, Colls. Phong Huy Pham, Mai Quynh Pham, Dinh Thi Nguyen, Duong Dinh Tran, IB; Thai Nguyen: 8♀♀, 1♂♂, Thanh Cong, Luong Van Tri, and Pho Yen, 23.x.2023, 22.iv.2024, 27.vi.2025, sweep net, Colls. Phong Huy Pham, Duong Dinh Tran, IB; Hung Yen: 7♀♀, 2♂♂, Van Lam, Phu Cu, Pho Hien, and Hong Minh, 26.vii.2016, 18.viii.2017, 26.ix.2019, 23.v.2026, 29.v.2026, 7.vi.2026, sweep net, grapefruit garden, litchi garden, longan garden, Coll. Phong Huy Pham, Hoa Thi Dang, IB; Bac Ninh: 4♀♀, 3♂♂, Tu Son and Phat Tich, 21.vii.2016, 19.v.2026, 11.vi.2026, sweep net, grapefruit garden, Coll. Phong Huy Pham, IB; Phu Tho: 21♀♀, 24♂♂, Thu Cuc, Tan Son, Me Linh Station for Biodiversity, Lap Thach, Luong Son, Yen Thuy, An Nghia, Lac Luong, and Da Bac, 22.vii.1999, 27.v.2000, 18–19.v.2001, 1–10.x.2002, 20.v.2011, 6.vi.2013, 5–11.viii.2017, 24.vii.2019, 18.vii.2020, 22.vi.2024, forest, shrub, Soybean, insect net, Colls. Phong Huy Pham, Long Dang Khuat, Mai Phu Quy IB; Gia Lai: 1♀, Kon Ka King National Park, Dak Jo Ta, Mang Yang, 1.iii.2012, 800–850m, forest, Coll. Le Huy Thong, IB; Quang Ngai: 4♂♂, Dak Pxi and Chu Mom Ray National Park (Sa Thay) 30.iv.2016, 4.iii.2019, forest, Coll. Tran Thi Phuong Uyen, IB; Tay Ninh: 3♂♂, Duong Minh Chau and Binh Minh, 28.iv–14.v.2023, 11.vi–3.vii.2023, Malaise trap, Coll. Le Van Tho, IB; Ninh Binh: 2♂♂, Tam Chuc and Cuc Phuong National Park (Cuc Phuong), 9.v.2002, 27.vii.2025, forest, Colls. Pham Thi Nhi, Hoang Vu Tru, IB; Ha Noi: 6♀♀, 12♂♂, Hoa Lac, Thach That, Lien Mac, My Duc, Ba Vi National Park (Ba Vi), and Long Bien, 2002–2023, sweep net, Coll. Phong Huy Pham, IB; Son La: 7♀♀, 18♂♂, Muong Coi, Xuan Nha and Copia Nature Reserve (Thuan Chau), 15.v.2017, 11.vii.2017, 23.ix.2023, forest, sweep net, Coll. Phong Huy Pham, IB; Tuyen Quang: 10♀♀, 2♂♂, Lam Binh, Quan Ba, Vi Xuyen, and Phong Quang, 5–15.x.2001, 19.ix.2017, 26.v.2022, 16–19.vi.2023, 18–19.xi.2023, rice, sweep net, Colls. Hoang Vu Tru, Mai Phu Quy, Phong Huy Pham, IB; Cao Bang: 4♀♀, 2♂♂, Thanh Cong Nguyen Binh, Thanh Long, and Trung Khanh, 8.viii.2012, 28–29.v.2022, 13.vi.2023, 22.vi.2023, 22°32'29"N,

10°55'251"E, Colls. Phong Huy Pham, Hoa Thi Dang, IB; Dak Lak: 1♂, Chu Yang Sin National Park (Krong Bong), 28.vii.2008, forest, Coll. Long Dang Khuat, IB; Thanh Hoa: 4♀♀, 2♂♂, Nam Dong Nature Reserve, Thien Phu, 13–17.vi.2026, sweep net, Coll. Phong Huy Pham, IB.

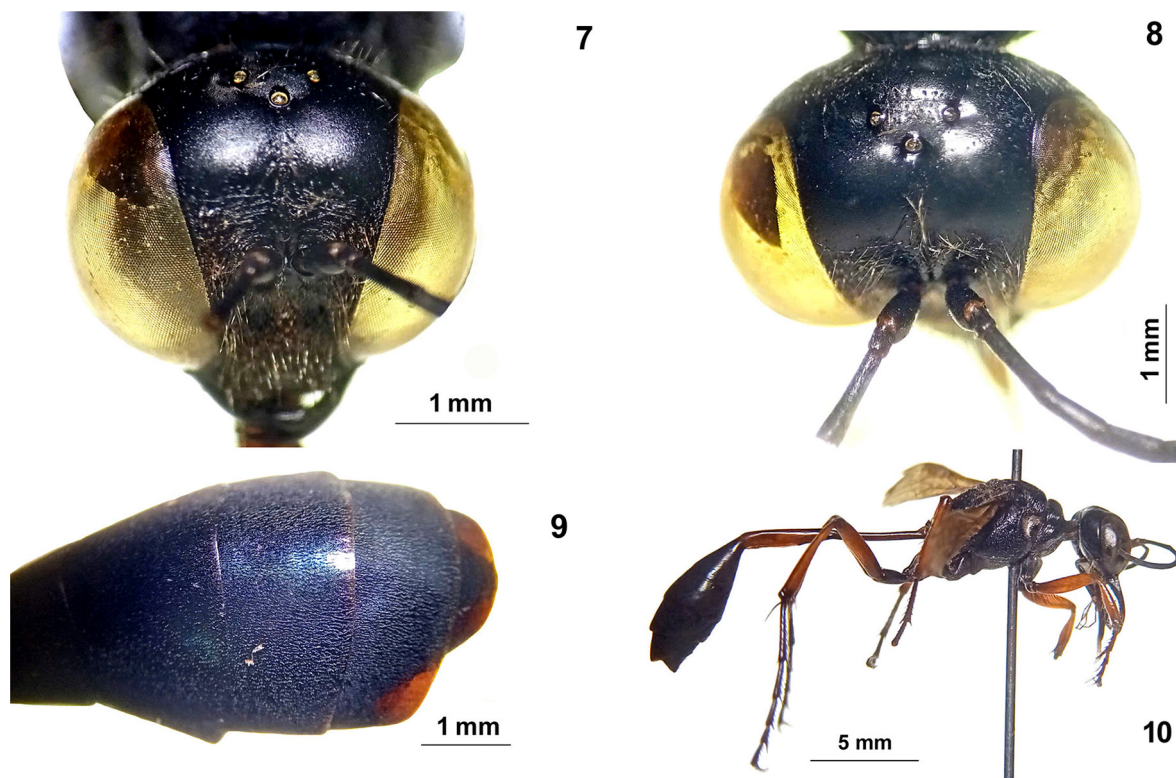
Distribution. Cambodia (first record), Laos, Vietnam [Nguyen et al., 2007; Dollfuss, 2013b; Pham et al., 2019, 2020, 2024, 2026]. Elsewhere: Australia, China: Hong Kong, India, Indonesia, Japan, Korea, Malaysia, Nepal, Pakistan, Philippines, Sri Lanka, Taiwan, Thailand [Dollfuss, 2013a,b; Pulawski, 2026].

Remarks. *Ammophila clavus* widely distributed in Vietnam, from plain to mountainous with recorded altitudes from some meters to about 1500 meters. The specimens of the species collected in Laos were more larger than those collected in Vietnam, 2.1–3.2 cm long compared to 1.5–2.6 cm long, but those collected in Cambodia were similar to those in Vietnam. There is no conspicuous variation of external morphological characters among specimens collected in the three countries. In Vietnam, the species occurred from April to November and took a overwintering from December to March, but it was found in January in Laos suggesting that *A. clavus* does not possibly overwinter in this country because this is a hinterland country and its winter is with a high average temperature level, from 18°C to 28°C, compared to that from 10°C to 20°C in Vietnam.

Ammophila globifrontalis Li et Yang, 1995

Figs 7–10.

Materials examined. VIETNAM. Cao Bang: 2♀♀, Truong Ha, 14.vi.2023, Coll. Phong Huy Pham, IB; Son La: 1♂, Kho Hong, Chieng Xuan, Van Ho, 24.ix.2023, sweep net, Coll. Phong Huy Pham, IB; Tuyen



Figs 7–10. *Ammophila globifrontalis* Li et Yang, female (7, 9, 10), male (8). 7 — head, frontal view; 8 — head, dorsal view; 9 — metasoma, dorsal view; 10 — habitus, lateral view.

Рис. 7–10. *Ammophila globifrontalis* Li et Yang, самка (7, 9, 10), самец (8). 7 — голова спереди; 8 — голова сверху; 9 — метасома сверху; 10 — общий вид сбоку.

Quang: 3♀♀, Khen village, Bac Me, 10.xii.2019, sweep net, Coll. Tran Thi Phuong Uyen, IB; Ha Noi: 1♂, Ba Vi National Park, Ba Vi, 28.v.2016, forest, sweep net, Coll. Phong Huy Pham, IB; Da Nang: 1♂, Son Tra, 9.iv.2011, sweep net, Coll. Dang Long Khuat, IB; Phu Tho: 2♀♀, 2♂♂, Lac Luong, Luong Son, An Nghia, and Xuan Son National Park (Xuan Son), 16.viii.1999, 15.vi.2004, 27.vi.2019, 5.viii.2019, soybean, sweep net, Colls. Vu Tru Hoang, Quynh Mai Pham, Phong Huy Pham, IB.

Distribution. Vietnam [Pham et al., 2020, 2024, 2026], China [Li, Yang, 1995; Wang et al., 2018; Pulawski, 2026].

Ammophila laevigata (F. Smith, 1856)

Figs 11–14.

Material examined. LAOS. Khammouane: 2♀♀, 1♂, Hin Namno National Park, Boudapha, 21–28.i.2021, Malaise trap, Coll. Nguyen Dinh Duy, IB. VIETNAM. Cao Bang: 3♀♀, 3♂♂, Thanh Long and Trung Khanh 28.v.2022, 13.vi.2023, 22.vi.2023, Coll. Phong Huy Pham, IB; Tuyen Quang: 3♀♀, 1♂, Phong Quang and Quan Ba, 26.v.2022, 16–19.vi.2023, Coll. Phong Huy Pham, IB; Bac Ninh: 3♀♀, 4♂♂, Tu Son and Phat Tich 21.vii.2016, 19.v.2026, 11.vi.2026, sweep net, grapefruit garden, Coll. Phong Huy Pham, Tran Dinh Duong, IB; Quang Ninh: 4♀♀, 1♂, Quang Duc and Uong Bi, 5.iv.2018, 26.viii.2024, Coll. Phong Huy Pham, IB; Thai Nguyen: 6♀♀, 2♂♂, Pho Yen, Ba Be National Park (Ba Be), and Luong Van Tri, 22.iv.2024, 3.iii.2025, 26–27.vi.2025, insect net, Colls. Phong Huy Pham, Pham Quynh Mai, Nguyen Thi Tu Anh, Tran Dinh Duong, IB; Phu Tho: 4♀♀, 5♂♂, Yen Thuy, Thu Cuc and Tam Thanh, 2.x.2002, 22.vi.2014, 5.viii.2017, 22.vi.2024, Colls. Phong Huy Pham, Mai Phu Quy, IB; Son La: 7♀♀, 11♂♂, Xuan Nha and Pha Luong, 20.v–18.vi.2018; 25–28.viii.2018, 20–25.ix.2023, sweep net, Malaise trap, Coll. Phong Huy Pham, IB; Ha Noi: 5♀♀, 4♂♂, Co Nhue and Thuong Cat, 22.vi–2.viii.2001; 12.vii.2017–22.vii.2019, 30.viii. 2020; 24.ix.2021, 9.x.2022, Coll. Phong Huy Pham, IB; Hung Yen: 2♀♀, 2♂♂, Pho Hien and Phu Cu, 23.v.2026, 7.vi.2026, sweep net, longan garden, litchi garden, Coll. Phong Huy Pham, IB; Thanh Hoa: 4♀♀, 2♂♂, Nam

Dong Nature Reserve, Thien Phu, 13–17.vi.2026, sweep net, Coll. Phong Huy Pham, IB.

Distribution. Laos, Vietnam [Dollfuss, 2013b; Pham et al., 2019, 2020, 2024, 2026], China, India, Nepal, Sri Lanka, Thailand [Pulawski, 2026].

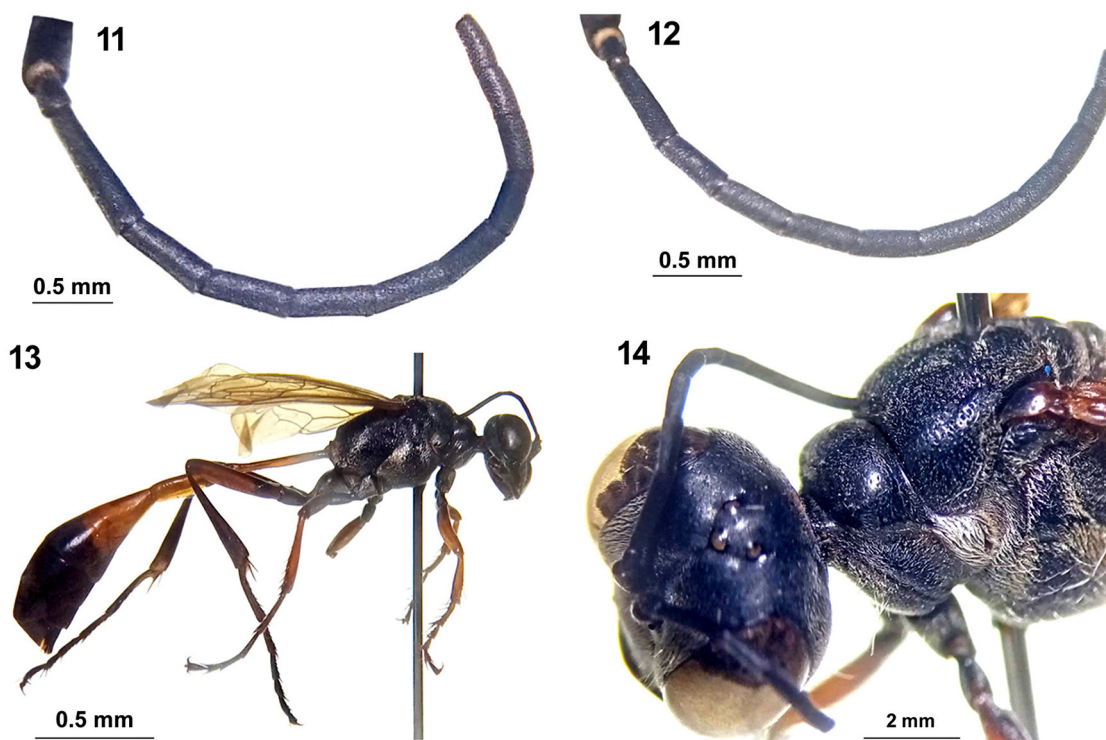
Ammophila sabulosa (Linnaeus, 1758)

Figs 15–16.

Materials examined. Vietnam. Tay Ninh: 2♂♂, Duong Minh Chau, 3–22.vii.2023, Malaise trap, Coll. Van Tho Le, IB.

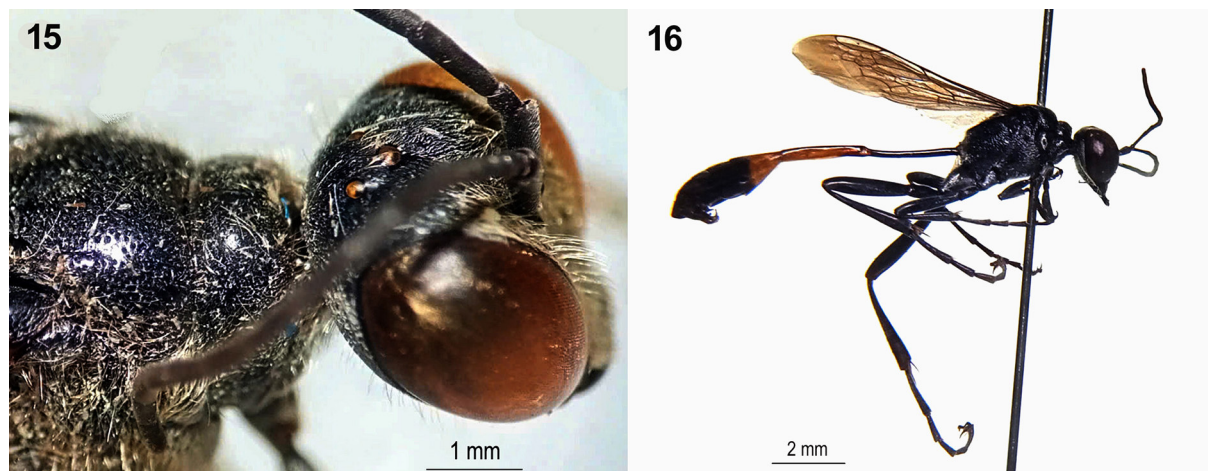
Diagnosis. Male: Clypeus moderately elongate, free margin slightly emarginate, disk nearly flat; hypostomal carina without tooth near mandibular socket; supra-antennal lamellate projection inconspicuous; flagellomere I: II = 1.7; vertex dull, sparsely punctate; clypeus, frons and pronotal lobe covered with appressed, silvery setae; pronotal collar and mesoscutum dull, sparsely punctate, not transversely ridged dorsally; propodeal enclosure covered with erect setae; mesopleuron without distinct patch of appressed silvery setae; legs black; forewing with three submarginal cells; petiole black; metasomal tergum I red with black dorsal stripe; basal two thirds of metasomal segment II red; metasomal apex with metallic shine. Body 16.7 mm.

Distribution. Vietnam (first record). Elsewhere: Albania, Algeria, Austria, Azerbaijan, Belarus, Belgium, Bulgaria, Canary Islands, China, Croatia, Czech Republic, Denmark, England, Finland, France, Greece, Germany, Great Britain, Hungary, India, Iraq, Iran, Ireland, Italy, Japan, Kazakhstan, Korea, Kyrgyzstan, Latvia, Lithuania, Moldavia, Mongolia, Montenegro, Netherlands, Nepal, Norway, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Spain, Sweden, Sweden,



Figs 11–14. *Ammophila laevigata* (F. Smith), female (11, 13, 14), male (12). 11, 12 — antenna; 13 — habitus, lateral view; 14 — head and pronotum, dorsolateral view.

Рис. 11–14. *Ammophila laevigata* (F. Smith), самка (11, 13, 14), самец (12). 11, 12 — усик; 13 — общий вид сбоку; 14 — голова и пронотум дорсолатерально.



Figs 15–16. *Ammophila sabulosa* (Linnaeus), male. 15 — head and pronotum, dorsolateral view; 16 — habitus, lateral view.
Рис. 15–16. *Ammophila sabulosa* (Linnaeus), самец. 15 — голова и пронотум дорсолатерально; 16 — общий вид сбоку.

Switzerland, Tajikistan, Turkey, Ucraina, Uzbekistan [Pulawski, 2026].

Remarks. Although the sampling has been carried out throughout Vietnam since 2015, *A. sabulosa* has only been discovered in Southern Vietnam with a small population density. *Ammophila sabulosa* has a wide distribution in the Palearctic region suggesting that this species is original and native to the region, but invasive in Vietnam.

KEY TO THE *AMMOPHILA* SPECIES FROM VIETNAM, LAOS, AND CAMBODIA

1. Female, antenna with ten flagellomeres (Fig. 11); metasoma appearing five-segmented (Fig. 4) 2
— Male, antenna with eleven flagellomeres (Fig. 12); metasoma appearing six-segmented (Fig. 5) 5
2. Pronotal collar dorsally without transverse rugae (Fig. 14) 3
— Pronotal collar dorsally with coarse transverse rugae (Fig. 3) 4
3. Legs black *A. sabulosa* (Linnaeus, 1758)
— Legs partly red (Fig. 13) ... *A. laevigata* (F. Smith, 1856)
4. Upper frons with two large, hairless, arched, and shiny projections (Fig. 7); black portion of metasoma with inconspicuous blue reflection (Fig. 9); ocelli small; mid and hind tarsi black (Fig. 10)
..... *A. globifrontalis* Li et Yang, 1995
— Upper frons without two large, shiny projections (Fig. 1); black portion of metasoma with conspicuous blue reflection (Fig. 4); ocelli large; mid and hind tarsi all or partly red (Fig. 6) *A. clavus* (Fabricius, 1775)
5. Pronotal collar dorsally without transverse rugae (Fig. 15) 6
— Pronotal collar dorsally with coarse transverse rugae ... 7
6. Petiole and legs black (Fig. 16)
..... *A. sabulosa* (Linnaeus, 1758)
— Petiole and legs partly red *A. laevigata* (F. Smith, 1856)

7. Upper frons with two large, hairless, arched, and shiny projections (Fig. 8); black portion of metasoma with inconspicuous blue reflection; ocelli small (Fig. 8)
..... *A. globifrontalis* Li et Yang, 1995
— Upper frons without two large, shiny projections (Fig. 2); black portion of metasoma with conspicuous blue reflection (Fig. 5); ocelli large (Fig. 2)
..... *A. clavus* (Fabricius, 1775)

Acknowledgements

The supply of specimens by Mr. Nguyen Thanh Tu, Eakar, Dak Lak; Dr. Nhi Thi Pham and Mr. Nguyen Dinh Duy, Institute of Biology, Hanoi, Vietnam; and MSc. Tho Van Le, Institute of Life Sciences, Xuan Hoa, Ho Chi Minh, Vietnam is gratefully acknowledged. The author is sincerely grateful to Dr. Wojciech J. Pulawski, California Academy of Sciences, San Francisco, USA for providing valuable literature. I thank the editor Dr. Maxim Yu. Proshchalin and the reviewer Dr. Yuriy N. Danilov for their thoughtful comments and suggestions, which greatly improved the original manuscript. This study was supported by the Vietnam Academy of Science and Technology (VAST) under grant number QTB01.06/26-27.

References

- Danilov Yu.N. 2015. New and little known digger wasps of the genus *Ammophila* W. Kirby, 1798 (Hymenoptera: Apoidea: Sphecidae) from Central Asia // Zootaxa. Vol.3964. No.5. P.537–545. <http://dx.doi.org/10.11646/zootaxa.3964.5.3>
- Danilov Yu.N. 2020. Digger wasps of the families Ampulicidae and Sphecidae (Hymenoptera: Apoidea) in the collection of the Institute of Systematics and Ecology of Animals, Novosibirsk, Russia // Euroasian Entomological Journal. Vol.19. P.316–321.
- Dollfuss H. 2013a. Revision of the wasp genus *Ammophila* Kirby 1798 (Hymenoptera: Apoidea: Sphecidae) of the Palearctic Region and India // Linzer Biologische Beiträge. Bd.45. S.383–564.
- Dollfuss H. 2013b. The Ammophilini Wasps of the “Biologiezentrum Linz”-collection in Linz, Austria (part 2) including the genera *Ammophila* Kirby and *Podalonia* Fernald (Hymenoptera, Apoidea, Sphecidae), and description of the hitherto unknown male of *Podalonia*.

- podalonia erythropus* (F. Smith 1856) // Linzer Biologische Beiträge. Vol.45. P.565–591.
- Dollfuss H. 2015. The Ammophilini wasps of the “Biologiezentrum Linz”-collection in Linz, Austria (part 3) including the genera *Ammophila* Kirby, *Eremnophila* Menke, *Eremochares* Gribodo, *Hoplammophila* de Beaumont and *Podalonia* Fernald (Hymenoptera, Apoidea, Sphecidae) // Linzer Biologische Beiträge. Vol.47. P.413–439.
- Evans H.E. 1959. Observations on the nesting behavior of digger wasps of the genus *Ammophila* // American Midland Naturalist. Vol.62. P.449–473.
- Iwata K. 1939. Habits of some solitary wasps in Formosa (IV) // Transactions of the Natural History Society of Formosa. Vol.29. P.161–178.
- Iwata K. 1964. Bionomics of non-social wasps in Thailand // Nature and Life in Southeast Asia. Vol.3. P.323–383.
- Kohl F.F. 1906. Die Hymenopterengruppe der Sphecinen. III. Monographie der Gattung *Ammophila* W. Kirby (se. Lat.-Ammophilinae Ashmead). Abteilung A. Die Ammophilinen der paläarktischen Region // Annalen des k.k. Naturhistorischen Hofmuseums. Vol.21. P.228–382. pls VII–XIII.
- Krombein K.V. 1984. Biosystematic studies of Ceylonese Wasps, XII: behavioral and life history notes on some Sphecidae (Hymenoptera: Sphecoidea) // Smithsonian Contributions to Zoology. Vol.387. P.1–30.
- Li Q., Yang Ch. 1995. [Hymenoptera: Sphecidae] // Wu H. (Ed.): Insects of Baishanzu Mountain, Eastern China. Beijing: China Forestry Publishing House. P.573–575. [In Chinese, with English summary].
- Maxwell-Lefroy W. 1909. Indian insect life: a manual of the insects of the plains (tropical India). Calcutta and Simla: Thacker, Spink & Co. xii + 786 p., 84 pl.
- Menke A.S. 2020. The *Ammophila* of North & Central America (Hymenoptera, Sphecidae). Arizona: Ammophila Press. 162 pp.
- Nguyen T.P.L., Khuat D.L., Do V.L., Luong V.H. 2007. [Survey of bees and wasps (Hymenoptera) in Cuc Phuong National Park] // Proceedings of the 2nd National Scientific Conference on Ecology and Biological Resources. Agriculture Publishing House. P.415–419. [in Vietnamese, with English summary].
- Pham P.H., Antropov A.V. 2021. Contributions to the knowledge of the spheciformes fauna (Hymenoptera: Ampulicidae, Crabronidae, Sphecidae) from Vietnam // Russian Entomological Journal. Vol.30. No.3. P.314–322. <http://dx.doi.org/10.15298/rusentj.30.3.09>
- Pham P.H., Nguyen T.A.T. 2023. On solitary wasps (Insecta: Hymenoptera) collected in Hin Namno National Park, Laos // Proceedings of international workshop “sustainable management and development of environment and natural resources”. Agriculture Publishing House. P.22–29. <http://dx.doi.org/10.15625/vap.2023.0004>
- Pham P.H., Kumar P.G., Danilov Y.N. 2015. Distributional checklist of sphecid wasps (Hymenoptera, Ampulicidae, Sphecidae, Crabronidae) from Vietnam // Linzer Biologische Beiträge. Vol.47. No.2. P.1581–1599.
- Pham P.H., Truong X.L., Nguyen T.A.T., Nguyen T.H., Nguyen Q.C., Nguyen T.M. 2019. Species composition and distribution of sphecid wasps (Hymenoptera: Sphecidae) in Ha Noi and its vicinity // *Academia Journal of Biology*. Vol.41. No.2. P.71–77.
- Pham P.H., Nguyen T.A.T., Nguyen Q.C., Nguyen T.M., Dang T.H., Nguyen D.H., Tran T.N., Nguyen T.D., Pham V.P. 2020. Solitary wasps of the family Sphecidae (Hymenoptera: Apoidea) in Hoa Binh, Vietnam // Proceedings of the 10th Vietnam National Conference on Entomology. Agriculture Publishing House. P.155–159.
- Pham P.H., Pham M.Q., González J.M. 2024. Nesting and mating behaviours, and the development time of three solitary digger wasps of the genus *Ammophila* (Hymenoptera: Sphecidae) // *Animal Biology*. Vol.74. No.4. P.335–352. <https://doi.org/10.1163/15707563-bja10144>
- Pham P.H., Tran D.D., Pham Q.P., Nguyen T.A.T., Nguyen H.V. 2026. Taxonomic studies of the family Sphecidae (Hymenoptera: Apoidea) in northeast Vietnam // Proceedings of the 12th Vietnam National Conference on Entomology. Agriculture Publishing House. P.147–163.
- Pulawski W. 2026. Catalog of Sphecidae. Available at: http://researcharchive.calacademy.org/research/entomology/entomology_resources/hymenoptera/sphecidae/genera/Ammophila.pdf (accessed 3 May 2026).
- Tano T., Kurokawa H. 2015. The wasps and bees collected in central part of Vietnam // *Tsunekibachi*. Vol.27. P.25–30.
- Tsuneki K. 1968. The biology of *Ammophila* in East Asia (Hym., Sphecidae) // *Etizenia*. Vol.33. P.1–64.
- Wang Ch.H., Bashir N.H., Li Q., Ma L. 2018. The genus *Ammophila* Kirby in China with descriptions of two new species (Hymenoptera: Apoidea: Sphecidae) // *Journal of the Kansas Entomological Society*. Vol.90. P.291–303. <https://doi.org/10.2317/JKESD1600030.1>

Поступила в редакцию 21.6.2026